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The primary research objectives of the 44-month project were to determine the extent to which members of experimental and control groups would differ, after training in academic achievement, vocational achievement, personal-social characteristics, and job placement and job success. The subjects were unemployed or underemployed school dropouts, between the ages of 17 and 22, who had been out of school for at least 1 year. Comparisons were made among the groups: 118 subjects who received a combination of vocational and academic training, 115 subjects who received only vocational training, 59 subjects who received only academic training, and 46 subjects who received little or no training (control group). A pre-test/post-test control group design and extensive use of analysis of covariance procedures were basic to the study. Findings included: (1) During the first year covered by the followup period, the academic-vocational and the vocational groups exceeded the control group in proportions entering the labor market, in average number of weeks of employment, and in average annual earnings, and (2) By the end of second year of followup, however, there were fewer significant differences on each of these variables. The research paradigm, the educational program, a description of instrumentation and analysis, and a summary of related doctoral dissertations are included. (PS)

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AN EXPERIMENTAL APPRAISAL

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J. Paschal Twyman, and Gaylon R. Wallace

Sponsored by
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CHAPTER I

INTRODUCTION, BACKGROUND, AND STATEMENT OF THE PROBLEM

This is a report of a 44-month investigation in which three curricular approaches to rehabilitating school dropouts were evaluated under experimental conditions. The total project including the planning, the funding, the selection and training of subjects, and the evaluation of outcomes, represents an attempt to bring together the resources of many agencies to seek solutions for a persistent social problem. Involved in the project at one stage or another were a major private foundation; a metropolitan public school system; a state university; and local, state, and federal governmental agencies.

Individuals who participated in the experimental project received either a combined program of academic and vocational training, vocational training alone, or academic training alone. Control groups made up of comparable individuals who received little or no training were also included in the investigation for comparison purposes. A total of over three-hundred school dropouts between seventeen and twenty-two years of age participated. Approximately fifty percent of the total were members of minority groups, including individuals of American Indian, Negro, and Spanish American extraction.

The design of the study permitted an evaluation of achievement during a training period and also of vocational success, continuation of education, and general satisfaction with life during a two-year follow-up period.

The remainder of this chapter is devoted to a presentation of background material illustrating both the need and the rationale for the study. Four major research questions which serve as foci for the study are presented at the end of the chapter on pages 16 and 17. Four succeeding chapters present the methodology of the study, differences observed by the end of training periods, differences observed during a two-year follow-up period, and an overview of the entire investigation, in that order.

Background and Related Literature

The school dropout--the individual who fails to complete a high school education or an equivalent program of studies--has in recent years become the object of increased national concern. In January of 1965, President Johnson, after discussing America's continuing efforts to provide free education for all its children, said to Congress:

> There is a darker side to education in America: One student out of every three now in the fifth grade will drop out before finishing high school, if the present rate continues. Almost a million young people will continue to quit school each year, if our schools fail to stimulate their desire to learn. In our 15 largest cities, 60 percent of the 10th grade students from poverty neighborhoods drop out before finishing high school (15).

The magnitude of the dropout problem can be emphasized best by reiterating two facts from the preceding quotation. At the present time, approximately one-third of American young people fail to complete a secondary school program, and almost a million quit school each year.

Serious economic problems are related to the school dropout problem. Unskilled jobs once available to the school dropout are diminishing in number relative to the total work force and are being sought by older workers who have been displaced elsewhere in the world of work by technological change. Regarding this problem, Conant says:

> The recent trend in employment opportunities indicates that fewer and fewer completely unskilled workers will be able to obtain jobs in the decade ahead. Employers will want skilled workers. If present trends continue, professional workers will be in heavy demand. White collar jobs will grow at a more rapid rate than will blue collar jobs and it is quite clear that...there will be little demand for unskilled workers (8, p. 51).

There seems to be a long-term and rather stable relationship between number of years of schooling completed and employment rates. Schreiber (22) points out that, in 1952, the median number of years of schooling of unemployed males was 8.8, while for the employed the median was 10.4 years; in 1962, the medians were 10.0 years and 12.1 years, respectively. Schreiber also shows that data for 1960 presented by the Bureau of Census indicates that, with age kept constant, number of years of schooling and the unemployment rate were inversely related.

> For males, 18 to 19 years of age, the rate for those with less than 9 years of schooling was 17 percent; for those with 9 to 11 years of schooling, the rate was 16 percent; and for high-school graduates, it was 10 percent (22, p. 215).

Wolfbein (31) makes a somewhat different type of comparison. "The data show that for 1961 the unemployment rate among new high school dropouts was 27 percent, more than five times that of the national average." The U. S. Bureau of Labor Statistics (3) found twice as many dropouts as graduates among the long term unemployed. Sexton (23) reports that during the 1958 recession a college graduate had a 90 percent chance of being employed for a full year, a high school graduate had a 75 percent chance, but a worker with less than a high school education had only a 50 percent chance of being employed for an entire year.

A number of viewpoints have been taken relative to the tendency of industry to increase educational entrance requirements for new workers. Miller (14) has called the situation "credentialism". He feels that we are increasingly evaluating people on the basis of their credentials, rather than on the basis of their performance. In his view, the diploma has become a union card for jobs. Greene (11) takes a somewhat similar view. He feels that the high school diploma as a criterion provides a plausible excuse for turning away large number of Negroes and other disadvantaged applicants. Arbuckle (1) has pointed to the possibility that businesses want employees who are retrainable, and it is assumed that persons who have not completed high school cannot quickly learn new skills. Taber (27) has referred to the practice of "stockpiling" talent within a company. Lower-level jobs are filled by persons with high potential so that the company has a reserve of employees upon whom it can rely in times of need. Obviously, such a practice can aggravate a shortage of manpower for higher level positions. Some would take the view that jobs being created in large numbers by recent technological changes require higher levels of intellectual, vocational, and personal competence than most school leavers have to offer. Regardless of which of the preceding explanations is accepted, the importance of successfully completing a secondary school program in order to obtain and retain employment is stressed.

Various social ills are also frequently associated with the school dropout problem. Schreiber (21) cites a study conducted by the New York State Division for Youth in which it was found that "one-third of the dropouts come from families with histories of public and private assistance, more than 40 percent from families where there had been involvement with crime and delinquency, over half from families with histories of either welfare or crime and delinquency." Studies in Seattle and Bridgeport, also cited by Schreiber, further support the relationship between the dropout and delinquency problems:

> To put it another way, the delinquency rate for Seattle dropouts was 12 times and, for Bridgeport dropouts, 8 times that of stay-ins. However, we would be doing ourselves, as well as the dropouts, a disservice if we condemn all of them, because 65 percent of the Seattle dropouts and 76 percent of the Bridgeport dropouts had not been involved in the courts in any way. On the other hand, it would simply be self-defeating not to acknowledge that unemployed dropouts are more susceptible to delinquency than other youth and not to recognize the deeper "cultural" congruencies between the dropout and the delinquent (22, p. 227).

For reasons that will be discussed in more detail later in this chapter, the economic and social problems associated with the dropout problem tend to be self-perpetuating. Schreiber (22) cites numerous studies to establish the sharp differences in amount of schooling completed by parents of dropouts and by parents of graduates. In a Maryland study, 78 percent of the mothers and 80 percent of the fathers of dropouts had not finished high school. Also, 25 percent of the mothers and 30 percent of the fathers had not gone beyond the sixth grade. In Ohio, almost 70 percent of the mothers and fathers of dropouts were themselves dropouts, and the percentage rose to 80 for parents of pupils who dropped out in the tenth grade. In Pocatello, Idaho, fathers of 99 percent of the dropout boys and 76.5 percent of the dropout girls had failed to complete high school. Corresponding percentages for fathers of boy and girl graduates were 32.0 and 32.6, respectively. In Dade County, Florida, 69 percent of the parents of dropouts were themselves dropouts, but only 37 percent of the parents of graduates had less than 12 years of schooling.

The characteristics of the school dropout have been extensively investigated. While each dropout is an individual whose reasons for leaving school were peculiar to him, there does seem to be some value in briefly examining the tendencies and modal findings in studies of the characteristics of dropouts. Schreiber (22), in his excellent chapter, brings together the basic findings about the characteristics of dropouts. By examining some of the more salient points and data reported by Schreiber, it is possible to develop an understanding of the dimensions of the dropout problem. First, characteristics that are more individual in nature will be examined, to be followed by a discussion of characteristics that pertain more to family and social background.

A number of studies indicate that overall, approximately the same percentages of both sexes became school dropouts. Schreiber points out the effect of compulsory school attendance laws in producing the finding that the typical dropout is 16 years of age at the time of leaving school. However, he feels that psychologically and emotionally, the dropping-out occurs before that age. Also, the Maryland study reported that 40 percent of the dropouts were 17 years of age or older at the time of leaving school. The U. S. Bureau of Labor Statistics study compared I.Q.'s of graduates and dropouts. Twenty-one percent of the graduates and 46 percent of the dropouts had I.Q. scores below 90. Sixty-three percent of the graduates and 48 percent of the dropouts were in the I.Q. range of 90-109. Sixteen percent of the graduates and six percent of the dropouts had I.Q. scores of 110 and above. Schreiber concludes that "at least half of all...dropouts have the intelligence to benefit from a high school program leading to graduation; and that approximately 10 percent have enough intelligence to pursue a college education" (22, p. 221). Grade at which dropping out occurs is related to compulsory school attendance laws. It is not surprising that 25 to 40 percent of all dropouts quit in the tenth grade. However, in the Maryland study, it was found that 40 percent had never completed junior high school. Possible creative factors are the stress connected with the transition from junior to senior high school and the increased social awareness experienced by youngsters at that age. The Maryland study found that more than half of the dropouts had repeated a grade, at least once, in the elementary or junior high school. In Louisiana only 20.3 percent of the dropouts were not academically retarded. The crucial importance of general language development to success in the usual school situation is now well recognized.

Schreiber points out that the dropout seldom participates in school-wide activities. He cites the Dade County, Florida, study in which it was found that 91.9 percent of the dropouts were not participating in extracurricular activities at the time of withdrawal, while only 34.2 percent of the graduates were not engaged in such activities. A review of the relationship of school discipline problems to dropping out indicates that, while the majority of dropouts were not considered to be severe discipline-problem cases, there is a considerably higher incidence of disciplinary problems among later dropouts than among graduates. Schreiber cites the Orange County, California, survey which reported that 18 percent of the dropouts were such serious discipline cases that the school initiated their early school leaving. Similarly, in Tucson, Arizona, 15 percent of the dropouts had been classified as severe discipline cases and were requested to leave or were expelled.

An examination of the characteristics of dropouts in terms of their family and social class backgrounds is helpful in discerning the dimensions of the problem. There seems to be a constellation of economic, social, and cultural factors which are interrelated. The relationship between parents' level of education and the tendency of their children to drop out of school was presented earlier in this chapter. Schreiber cites the Modesto study which reported that 64 percent of the girl dropouts and 48 percent of the boy dropouts came from broken homes, as compared to 12 percent of the girl and 28 percent of the boy graduates. Occupational status and economic factors are illustrated by the following data. In Los Angeles almost half of the parents (fathers or heads of household) of dropouts were employed in unskilled, service, or semiskilled occupations, while only one-sixth of the parents of graduates were so employed. In the Lakeland (Wisconsin) Union High School District study it was found that 33 percent of the dropout group as compared to six percent of the graduate group had family incomes of less than $3,000. Schreiber states that the dropout rate reported for Negroes is from one-and-one-half to two times that reported for whites--a relationship that prevails in the northern cities as well as throughout the southern states. A study of a school in Portland, Oregon, found that Negroes made up 61 percent of the total dropouts as compared to 39 percent for whites, although the school's enrollment was 73 percent white. While dropping out of school can occur anywhere along the sociocultural scale, it is predominantly a lower-class problem. A striking example is provided by River City in which 87.7 percent of the dropouts were in the lower class and 1.4 percent were in the upper-middle class. The above data summarizing the tendencies found in the studies of family and social background characteristics of dropouts takes on crucial importance when it is coupled with the fact that a child's attitude toward schooling is developed and shaped first in the home. Statewide studies both in rural Louisiana and in New York estimated that two-thirds of the parents of school dropouts held negative or indifferent attitudes toward education. However, almost all of the parents of in-school students considered that the lack of a diploma would be a serious obstacle to later success. Schreiber concludes that many, and perhaps most, of the parents of dropouts do not place any great value on or hope in education.

The preceding data drawn from Schreiber's (22) chapter can be integrated within a social-psychological theory utilizing such constructs as the nature of group and culture, the reference group, significant others, and the self-concept. Such an interpretation seems to aid in developing meaning from the vast array of accumulated information dealing with the dropout phenomenon, as well as providing some understanding of the dynamics of the dropping-out process. The preschool child is a member of a primary group, the family. Members of the family are his first significant others. The family serves as an instrument of cultural transmission. The values, attitudes, and patterns for living transmitted by the potential dropout's family, developing as they do out of sub-cultural traditions, deprived environments, and lower status occupational roles, may be out of step with the dominant culture and its needs. The early primary group constitutes the young child's first reference group. Its values and norms form the frame of reference and the anchorages for perceptions of others as well as early self-conceptions. Thus the lower class or minority group child may enter school with not only a lack of readiness for the school's verbal, conceptual, and perceptual demands, but also with a lack of readiness growing out of attitudes and values, frames of reference, and self-conceptions which will inhibit the development of behavior that would be effective in coping with the intellectual and social demands of the school setting. For many such children, as reinforcement in the school becomes increasingly negative or punitive, as failure instead of success becomes expected, as the clash between the middle class values and norms of the school and the lower class orientation of the home becomes more obvious, there is a failure to identify with the school and teachers and withdrawal develops. At first this withdrawal may be primarily psychological. The child stops seeking the positive rewards offered by the school and instead merely seeks to minimize the negative rewards by "staying out of trouble". He may fail to see any relationship between the curriculum and his life outside of the school, or he may lack the motivation to work for a delayed reward. Aggression, which may be either active or passive in nature, may develop. Not feeling that he belongs in the school setting, the potential dropout, by the time of adolescence, is susceptible to the influence of a peer group possessing a culture of aggression, frustration, and protest, as Cervantes' (5) study pointed out. Coleman (7) similarly concluded that the adolescent who cannot find status within the school will try to find it elsewhere. If the values of the peer group are perceived by the adolescent as running counter to those of the home, conflict is a likely result. If values of the peer group and the home are congruent, in that a negative perception of the school is shared, dropping-out is an easy and natural consequence. The preceding theoretical analysis provides a background for the interpretation of the intriguing findings of the Modesto study, cited by Schreiber (22), of the self-concepts of dropouts. Significant differences at the .01 level were found in comparisons of the responses of graduates and dropouts to questions pertaining to feelings about rejection in the school situation, self-concept of academic ability, and adequacy of skills useful in getting a job.

If the causative factors in the dropout problem are as complex and deep-rooted as the foregoing empirical and theoretical analysis suggests, attempts at prevention and remediation cannot be simple and confined to surface manifestations. Many dropout prevention and rehabilitation programs have been initiated across the United States in recent years. Programs designed to reduce the incidence of early school leaving focus on early identification of potential dropouts and specially designed curricula. In most cases, particular attention is given to development of basic language skills and some means of cultural enrichment. Some centers have adopted flexible class schedules and have increased their use of audio-visual materials and modern teaching devices in an effort to enhance learning for the potential dropout. Work-study programs have been developed in a number of cities for potential dropouts in the higher grades. In other cities, occupational guidance sessions are offered to help prepare individuals for the transition from school to work.

Local remedial programs for persons who have already dropped out of school have been initiated both on a voluntary and a compulsory basis. The importance of providing such programs for the almost one million dropouts each year is obvious. Few generalizations can be made regarding these programs except that they usually include some form of occupational training and/or some type of occupational information or counseling service to help prepare the dropout for employment. Academic work is sometimes included in such programs, but it is usually somewhat modified from the regular high school offering.

Of significant importance to this general problem area has been recent Federal legislation designed to deal with the issue of retraining large numbers of unemployed or underemployed workers (many of whom are school dropouts). Through the Area Redevelopment Act of May 1, 1961, (Public Law 87-27) and the Manpower Development and Training Act of March 15, 1962, as amended (Public Law 87-415), resources of the Federal government were committed to vast programs for training and retraining American workers. These programs are oriented specifically toward aiding the long-term or chronically unemployed worker who is, in most cases, an individual beset with serious socio-economic problems resulting from his failure to fit into a society characterized by rapid technological and cultural change.

Retraining clauses in recent Federal legislation appear to rest on two basic assumptions: first, that lack of a salable skill is a major cause of unemployment and underemployment; and secondly, that following completion of a skill-building course of study, workers will be adequately prepared to become and remain fully and gainfully employed--either in the local area or in other areas when needed.

Furthermore, by implication, the assumption appears to have been made that social-psychological factors either are not a major consideration in the etiology of unemployment or are effectively mitigated through experiences gained in a skill-building program. Finally, little attention has been given to the possibility that the skill-building or vocational courses might be bolstered by the addition of substantial amounts of academic content.

An assessment of efforts at remediation either by persuading dropouts to return to the regular school program or by providing training through the Manpower Development and Training Act programs is hindered by the lack of adequate measures of criteria of success and by a complete absence of or only short follow-up periods. Slotkin (25) describes a program designed to provide a brief period of training in how to get a job. After receiving attention in this type of program, a significant number returned to the regular school program and stayed on to graduate. Super (26) compared small groups of high school graduates, "regular" dropouts, and dropouts who had later received equivalency diplomas. He found the returnees to be significantly poorer than the regular dropouts in vocational maturity, achievement motivation, and self-esteem. This finding suggests either the inadequacy of the educational program or else the operation of selective factors in the decision to return to school. Greene (10) found, on the basis of a longitudinal study, that dropping out need not necessarily be the end of one's education. However, dropouts were more likely to subsequently drop out of trade schools, adult education courses, etc., than were graduates. Rutledge and Gass (19) describe a project in which 19 hard-core unemployed men, about half of whom were dropouts, were selected for a year's training. There were no voluntary dropouts during the year of training. Thirteen of the program finishers found immediate employment. An interesting aspect of this program was that the trainees were given intensive psychological support, with the atmosphere being almost therapeutic. Specific attempts were made to bolster their inadequate self-concepts. Chansky (6), reporting on North Carolina's Operation Second Chance, states that the trainees were more highly motivated toward their academic training, being bored by the more repetitious skill training. In a short follow-up of the 139 subjects, it was found that 56 percent were unemployed and that only 25 percent had found training-related employment.

A review of the literature relative to the training and rehabilitation of dropouts points out the need for research to examine the assumptions upon which current training programs are based. Some central questions are:

(a) Will skill training and/or vocational training effectively rehabilitate dropouts?

(b) What contribution to the rehabilitation process can academic courses make?

(c) Are the social-psychological factors involved so complex that radically different remediation procedures are needed?

To obtain adequate criterion data for dealing with these questions, an extended follow-up process is obviously required.

The investigation reported herein represents an effort to provide at least partial answers to the above questions. A brief statement of the problem and the specific research questions for this investigation follow.

The Research Problem

In general, the dropouts selected for the project herein reported were subjected to a systematically manipulated non-graded vocational and/or academic curriculum designed to aid them in meeting salient occupational and educational requirements of area and regional employers. A major emphasis of the total program was directed toward an educational approach devoted to teaching selected program participants a set of pertinent and salable skills while providing in addition an opportunity for these participants to approach or fulfill minimum academic or general education requirements necessary for high school graduation.

In an attempt to experimentally determine the specific extent to which vocational programs can be complemented functionally by academic programs (and vice versa), it was necessary to programmatically manipulate or vary the "treatments" administered to various groups of participants. Some of the participants were given training in both vocational and academic subjects, others were given only vocational training, while a third group was given instruction in academic areas only. In addition, a general control group selected from the same population of school dropouts was given no training whatsoever. The research on the total program was conducted both during the period of training (from 20 to 48 weeks for various sub-groups) and for a two-year follow-up period after the completion of training.

Statement of Research Questions

ACHIEVEMENT IN ACADEMIC AREAS

The major research question on academic achievement was:

> To what extent will former dropouts who receive both academic and vocational training, only vocational training, only academic training, and no additional training, differ in terms of academic achievement levels?

The analysis for all groups encompasses the specific question of interest to the research staff which has to do with a comparison of the Academic-Vocational group with the Academic group on academic achievement. An additional concern was the relationship of certain other variables such as interest, anxiety, social class values, and social adjustment to academic achievement. Through the analysis of covariance, as described later, estimates were made of these relationships.

CHANGES IN SOCIAL-PSYCHOLOGICAL CHARACTERISTICS

The major research question on social-psychological characteristics was:

> To what extent will the various treated and untreated groups differ at the conclusion of the training period in terms of specified social-psychological characteristics?

An additional concern of the research staff, again, was with the relationship of various characteristics to the dependent variables being considered. Analysis of covariance procedures were used in examining these relationships.

ACHIEVEMENT IN VOCATIONAL TRAINING

The major research question on vocational achievement was:

> To what extent will the individuals who receive both academic and vocational training and those who receive only vocational training differ in terms of vocational achievement?

A variety of methodological considerations made it inappropriate or unfeasible to utilize analysis of covariance techniques with vocational achievement data in this study. Instead, a nonparametric procedure, the Mann-Whitney U test was used.

ACHIEVEMENT FOLLOWING THE TRAINING PERIOD

The major research question asked in relation to data collected in the follow-up study was:

> To what extent will the members of the various groups differ in terms of job placement history and job success over a two-year follow-up period?

Job placement history was examined in terms of percentages of the various groups who entered the labor force and the average number of weeks that they held employment. Hourly and annual earnings, job satisfaction, and employer ratings were used as measures of job success.

In addition to employment history and job success, comparisons also were made regarding continuation of training and the general satisfaction with life expressed by subjects during the follow-up period.

CHAPTER II

METHODOLOGY

The training phase of this particular project began in August, 1964, when the U. S. Departments of Labor and of Health, Education and Welfare, through the Manpower Development and Training Act of 1962, as amended, funded a youth program in the Greater Oklahoma City Area. Cooperating agencies were the Oklahoma State Board for Vocational Education, the Oklahoma Employment Security Commission, and the Oklahoma City Public Schools. Through the Research Foundation at Oklahoma State University, prior to this time, funding was requested and received from the Ford Foundation in support of research, evaluation, and other items not covered by Federal funds in the proposed youth training program.

The research aspects covered a total of 44 months--January, 1964, through August, 1967. The period from January through July of 1964 was devoted to staffing, conceptual development, instrument selection, and field contact work. Phase I of the project constituted the training programs beginning on August 3, 1964. All training programs were completed by June 30, 1965. Phase II of the project included a comprehensive two-year follow-up of subjects--June, 1965, through July, 1967.

Research Objectives

The primary research objectives of the project were to determine the extent to which members of experimental and control groups would differ, after training, in terms of: (a) academic achievement, (b) vocational achievement, (c) personal-social characteristics (interest, anxiety, personal and social adjustment, rural-urban orientation, and social class value orientation), and (d) job placement and job success. The first three objectives were studied in Phase I and the last objective was studied in Phase II of the project.

Appendix A shows a paradigm for the entire training and research project. Conceptualized in the paradigm are the course of development of the dropout phenomenon, the post-dropout condition, and the design for this experimental rehabilitation program and for its evaluation.

Research Procedures

This section includes a description of (a) the research design, (b) the population and selection of subjects, (c) a brief description of the training program, (d) the procedures used in collecting data, and (e) an overview of the statistical models used in the analysis of the data.

RESEARCH DESIGN

The basic plan for this project was a pretest-posttest control group design as described by Campbell and Stanley (4). The study included comparisons among five groups of subjects--three experimental groups and two control groups. The Academic-Vocational group received a combination of vocational and academic training, the Vocational group received only vocational training, while the Academic group received only academic training. The control groups consisted of Control group I, eligible youth who applied for the program but who did not enter it for training, and Control group II, those students who started the program but dropped out before a significant portion (designated as 15 percent) of their total projected training time had elapsed.

As the project moved into its follow-up phase, it became necessary to merge the control groups because there was some loss of subjects. Therefore, the reference to control subjects in Chapter IV is to the merged group.

POPULATION AND SELECTION OF SUBJECTS

The initial selection and subsequent assignment of persons to training was done by personnel of the Oklahoma State Employment Security Commission (after consultation with the Oklahoma State University project team) according to criteria established in the Manpower Development and Training Act of 1962, as amended. Persons selected were unemployed or underemployed school dropouts, between the ages of 17 and 22 who had been out of school for at least one year. Scores on the General Aptitude Test Battery and information gained from individual interviews were made part of the selection procedure to help ensure the selection of sufficiently motivate trainees with appropriate aptitudes. School officials estimated that slightly more than 2,000 youth in the Greater Oklahoma City Area could meet the selection standards. Through an intensive recruiting campaign by Oklahoma Employment Service personnel with the assistance of mass media advertisements, a total of 338 eligible subjects were selected for assignment either to Control group I or to one of three training groups. Table 1 lists the total number of subjects selected for inclusion in each of the various groups.

TABLE 1. ASSIGNMENT OF SUBJECTS

Skill training area	Academic-Vocational group	Vocational group	Academic group	Control group I
General Office Clerk, Refresher	21	9	...	...
Machine Tool Operator	11	11	...	...
Stenographer, Refresher	23	11	...	...
Welder, Combination	8	15	...	...
Office Machine Mechanic	12	9	...	...
Sheet Metal Worker	9	12	...	...
Cosmetology, Negro	13	13	...	...
Cosmetology, Non-Negro	12	18	...	...
Auto Mechanic	9	17	...	...
Total	118	115	59	46

DESCRIPTION OF THE TRAINING PROGRAMS

The academic portion of the program consisted of instruction in communications skills, mathematics, social studies, and science. Vocational skill areas offered were selected by the Oklahoma Employment Security Commission on the basis of findings from their labor market surveys. Titles of the eight programs offered are shown in Table 2, with the duration and completion date for each. Also shown is the duration and completion date for the academic instruction.

TABLE 2. TRAINING AREAS

Course	Weeks of training	Completion date
General Office Clerk, Refresher	20	December 18, 1964
Machine Tool Operator	26	January 29, 1965
Stenographer, Refresher	26	January 29, 1965
Welder, Combination	26	January 29, 1965
Office Machine Mechanic	36	April 9, 1965
Sheet Metal Worker	36	April 9, 1965
Cosmetology	43	May 28, 1965
Auto Mechanic	48	June 30, 1965
Academic[a]	43	May 28, 1965

[a] Subjects in the Academic-Vocational group received academic training only up to the completion date of their specific skill training program.

The Oklahoma State Board for Vocational Education was the agency with responsibility for setting up the instructional program. Staff supervisors representing that agency were available as needed during the training program. The operating agency for the project was the Oklahoma City Public School System. Instructional space was provided in the Central High School building and in a facility adjacent to the Washington School. Administrative and teaching personnel for the instructional program were employed by the Oklahoma City School System.

The major approach used in both vocational and academic phases of the training was individualized and nongraded. In addition, credits earned in academic areas could be counted toward a high school diploma. Programmed materials, audio-visual materials, and various devices and models for demonstration were used in instruction. Vocational skill teachers taught students from the Academic-Vocational group and from the Vocational group in the same class. Similarly, the teacher in each academic area taught the students from both the Academic-Vocational group and the Academic group. Thus, the possible effect of the teacher was controlled in those situations where it was pertinent.

Students who were enrolled in a vocational skill program attended class for five hours daily. Those enrolled in academic areas were in class three hours daily, and this three hours was used in a large block of time for each subject area. Students in the Academic-Vocational group had to meet the requirements of both schedules, thus attending for a total of eight hours daily.

In-school counseling was provided by a staff counselor who also served as overall director of training. Out-of-school counseling was provided by four counselors from the Oklahoma Employment Security Commission.

Formal instruction of students was supplemented by a variety of activities. Arrangements were made for special recreation programs at the YMCA and the YWCA. Teachers were encouraged to provide field trip experiences for the students. A speakers bureau composed of participants in the program was established. Outside speakers from government and private enterprise appeared before student assemblies. Special sessions with some of the regular staff at Central High School were arranged on such matters as grooming and learning social amenities and manners that might be important for students when seeking employment.

An extended description of the training program and related activities is presented in Appendix B. In a separate publication (16), an explicit overview of each course is provided.

DATA COLLECTION SCHEDULES, INSTRUMENTS, AND PROCEDURES

In accordance with the design of the project, data collection was accomplished in three phases. The first phase included collection of pretest data which could be used in all analyses. The second phase included posttest data collected during or at the completion of treatments. These data were used in the analysis of immediate treatment results. The third phase included data collected during the two years following the training period. These data were used in analyses of longitudinal effects of the treatments. Table 3 lists the data collection instruments and indicates their administration schedule. Appendix C includes a brief description of all instruments used in the project.

Various procedures were used in the collection of data. The General Aptitude Test Battery was administered by staff of the Oklahoma Employment Security Commission at local employment offices before subjects were admitted to the program.

On August 3, 1964, project staff members began administration of a battery of instruments to subjects who had been admitted to the program. Approximately ten hours of testing (over a two-day period) were necessary to complete the instruments. Each subject was required to complete the battery before being admitted to classes on August 5, 1964. Late enrollees and replacements followed the same procedure of completing the battery before admission to classes. Control group I was administered the battery two weeks later, starting on August 17, 1964. The battery included the five Sequential Tests of Educational Progress, California Test of Personality, IPAT Anxiety Scale

TABLE 3. INSTRUMENT ADMINISTRATION SCHEDULE

Instrument	Pretest	During treatment	Posttest Time I	Posttest Time II
General Aptitude Test Battery	X	...	...	...
Sequential Tests of Educational Progress	X	...	X	X
California Test of Personality	X	...	X	X
IPAT Anxiety Scale Questionnaire	X	...	X	X
Social Class Value Orientation Inventory	X	...	X	X
Rural-Urban Orientation Inventory	X	...	X	X
Kuder Preference Record - Personal	X	...	X	X
Initial Data Sheet	X	...	...	...
School Dropout Research Interview Schedule	...	X	...	...
Every Pupil Scholarship Test in Typewriting	X	...	X	...
Hiett Simplified Shorthand Test	X	...	X	...
Mellenbruch Office Skills Achievement Test	X	...	X	...
Office Machine Mechanic Test	...	...	X	...
Purdue Trade Information Test in Welding	...	...	X	...
Purdue Trade Information Test for Sheet Metal Workers	...	...	X	...
Purdue Test for Machinists and Machine Operators	...	...	X	...
Cosmetology Test	...	...	...	X
Mullenbruch Garage Mechanic Test	...	...	...	X
Teacher's Rating of Vocational Skill Performance	...	...	X	X
Youth Opportunity Follow-up Survey[a]	...	...	...	...
Goertzel Job Performance Scale[a]	...	...	...	...
Brayfield-Rothe Job Satisfaction Blank[a]	...	...	...	...

[a] Utilized in follow-up study; time schedule is shown in Table 6.

Questionnaire, Social Class Value Orientation Inventory, Rural-Urban Orientation Inventory, Kuder Preference Record, and the Initial Data Sheet.

At the end of the second week of training, students in General Office Clerk and Stenographer training were pretested by their skill training teachers on vocational tests. Students in the General Office Clerk class were administered the Every Pupil Scholarship Test in Typewriting and the Mellenbruch Office Skills Achievement Test. Students in Stenographer training were administered the same two instruments, and in addition, were given the Hiett Simplified Shorthand Test.

Beginning early in October, members of the research staff held interviews with the subjects, using the School Dropout Research Interview Schedule. Interviews were conducted during school hours and were in private locations within the school. Each interview was recorded on tape, transcribed by project secretaries, and finally coded by project staff for computer processing. Control group subjects also were interviewed under similar conditions.

For posttest purposes, the differing completion dates for subjects in vocational training made it necessary to divide all groups into two units. Units were then designated Time I (early posttest) and Time II (late posttest) according to program completion dates. The Time I unit completed posttests on January 7, 1965; the Time II unit completed them on May 6, 1965. The Academic group and Control group were randomly divided into two sub-groups (Time I and Time II) for posttesting. The numbers of subjects for whom complete pretest and posttest data were secured are shown in Table 4.

TABLE 4. STUDENTS INCLUDED IN ANALYSES

Group	Time I (early posttest)	Time II (late posttest)
Academic-Vocational	56	18
Vocational	42	13
Academic	19	15
Control I	15	12
Control II	13	14
Total	145	72

Instruments which were used in common for all groups were administered on a posttest basis at Time I and Time II. The instruments administered at these times were the five Sequential Tests of Educational Progress, California Test of Personality, IPAT Anxiety Scale Questionnaire, Social Class Value Orientation Inventory, Rural-Urban Orientation Inventory, and Kuder Preference Record (Personal). Alternate forms, when available, were used on the posttests. Students in General Office Clerk training were administered the posttest battery on December 15 and 16, 1964. Students in courses of Machine Tool Operator, Office Machine Mechanic, Sheet Metal, Stenographer, and Welder were administered the battery on January 5 and 6, 1965. A proportionate number of the Academic group students were selected at random to take the battery on the same dates. During the two weeks following the testing of the above groups, efforts were made to locate and test one-half of each of the Control groups. The control subjects who were sought were randomly selected from the total in Control group I who received no training and in Control group II who withdrew prior to completing 15 percent of the program to which they were assigned.

All subjects were tested in the school setting by members of the project staff.

The same procedures applied in administration of the battery to Time II subjects. Subjects in the two Cosmetology classes, the Auto Mechanics class, and all remaining Academic group members who were not tested at Time I were administered the battery on April 26 and 27, 1965. All remaining subjects in each of the two control groups who could be contacted were administered the battery on May 3 and 4, 1965.

The vocational achievement posttests were administered by the vocational teachers during the week preceding the completion of the respective vocational courses. Table 5 lists the class, instruments, and date of posttest administration for the vocational achievement instruments.

The Teacher's Rating of Skill Performance instruments were completed by the vocational teachers after completion of their specific skill courses. Students in the Vocational group and the Academic-Vocational group who were receiving the same vocational skill training were rated by the same vocational teacher.

Collection of follow-up data involved four contacts with each subject, these were at six-month intervals following completion of the program. Table 6 shows the schedule of follow-up contacts for each of the subject groups over the two year period in which observations were made. At each contact, the Youth Opportunity Follow-up Survey was completed. The survey was completed, whenever possible, by counselors from the Oklahoma City public schools who were employed on a part-time basis for this purpose. Subjects usually were interviewed in the

TABLE 5. POSTTEST ADMINISTRATION OF VOCATIONAL ACHIEVEMENT INSTRUMENTS

Course	Number of students		Instruments	Test date
	Academic-Vocational	Vocational		
General Office Clerk	19	5	Every Pupil Scholarship Test in Typewriting I and II	December 14-18, 1964
			Mellenbruch Office Skills Achievement Test	December 14-18, 1964
Machine Tool Operator	9	6	Purdue Test for Machinists and Machine Operators	January 25-29, 1965
Stenographer	12	6	Every Pupil Scholarship Test in Typewriting I and II	January 25-29, 1965
			Mellenbruch Office Skills Achievement Test	January 25-29, 1965
			Hiett Simplified Shorthand Test	January 25-29, 1965
Welder, Combination	6	12	Purdue Trade Information Test in Welding	January 25-29, 1965
Office Machine Mechanic	5	5	Office Machine Mechanic Test	April 5-9, 1965
Sheet Metal Worker	2	3	Purdue Trade Information Test for Sheetmetal Workers	April 5-9, 1965
Cosmetology, Negro	9	4	Cosmetology Test	May 24-28, 1965
Cosmetology, Non-Negro	6	3	Cosmetology Test	May 24-28, 1965
Auto Mechanics	2	5	Mellenbruch Garage Mechanic Test	June 21-25, 1965
Total	70	49		

TABLE 6. TWO-YEAR SCHEDULE OF FOLLOW-UP CONTACTS

Subject group	Program completion dates	Data collection schedule: Six months	Data collection schedule: One year	Data collection schedule: Eighteen months	Data collection schedule: Two years
General Office Clerk	Dec., 1964	June, 1965	Dec., 1965	June, 1966	Dec., 1966
Stenographer	Jan., 1965	Aug., 1965	Feb., 1965	Aug., 1966	Feb., 1967
Welder	Jan., 1965	Aug., 1965	Feb., 1965	Aug., 1966	Feb., 1967
Machine Tool Operator	Jan., 1965	Aug., 1965	Feb., 1965	Aug., 1965	Feb., 1967
Office Machine Mechanic	Apr., 1965	Oct., 1965	May, 1965	Oct., 1966	May, 1967
Sheet Metal Worker	Apr., 1965	Oct., 1965	May, 1965	Oct., 1966	May, 1967
Cosmetology	May, 1965	Dec., 1965	June, 1966	Dec., 1966	June, 1967
Academic	May, 1965	Dec., 1965	June, 1966	Dec., 1966	June, 1967
Auto Mechanic	June, 1965	Jan., 1966	July, 1966	Jan., 1967	July, 1967
Control, Time I[a]	Jan., 1965	Aug., 1965	Jan., 1966	Aug., 1967	Jan., 1967
Control, Time II[a]	May, 1965	Dec., 1965	May, 1966	Dec., 1966	May, 1967

[a] Program completion dates shown for control groups are the dates on which they completed posttests.

evening in their own home, and completed the survey instrument during the interview. The instrument was devised so that subjects who were no longer in the Oklahoma City area could complete the survey by mail if necessary.

Those subjects who reported that they were employed at the time of the follow-up also completed the Brayfield-Rothe Job Satisfaction Blank in relation to the job they held at the time.

During the first year of the follow-up the Goertzel Job Performance Scale was sent to all employers for whom subjects had worked. Excellent cooperation was obtained and a high proportion of employers returned the forms with the desired information. Time did not permit collection of this type of data after completion of the second year of the follow-up.

Throughout the follow-up period, concerted efforts were made to locate all subjects and to obtain complete follow-up data from them. Multiple addresses of people who might know the location of a subject if he moved were acquired during the original interview and at the time of each contact. Close contact was maintained with the local employment office counselors who also were acquainted with subjects in the experimental groups.

STATISTICAL PROCEDURES

Extensive use was made of analysis of covariance procedures in this investigation. In identifying the pretest scores to be used as concomitant variables in the analysis of covariance, the initial procedure was to estimate the impact of these variables on each dependent variable by a multiple regression technique. The multiple regression computer program chosen for this purpose calculates the reduction in the sums of squares due to each variable after adjusting for all the other variables. The program's output includes the F value for the adjusted sum of squares for each variable and the multiple correlation coefficient.

In the initial regression analysis each subtest score for all the instruments used was entered as a variable. It was decided, arbitrarily, to hold for further analysis those variables on which F value on adjusted scores was 1.00 or higher.

A second regression analysis was made of the variables that were retained as a result of the first step. For a variable to survive the second step, the F value on adjusted scores was evaluated at the .05 level of significance. This procedure is presented more fully in Appendix D.

The analysis of covariance, then, afforded the basic statistical procedure for evaluating many project results. Several basic strategies developed by Hamm (12) for the use of this statistic were utilized. Comparisons which yielded F values at the .05 level of significance or higher were followed by a test for the adjusted means taking two groups at a time. Since a simple t test is usually regarded as not being appropriate for making a posteriori comparisons, the method developed by Scheffe' was followed (20). This method is reported to be more rigorous than others with regard to Type I errors, and Scheffe' has suggested therefore that the .10 significance level should be used in applying his test.

Data on achievement in vocational training presented in Chapter III were analyzed by Mann-Whitney U test procedures, as outlined by Siegel (24).

For the follow-up study, data which were essentially continuous and interval in nature were examined through analysis of covariance techniques, with general intelligence (as measured by the General Aptitude Test Battery, G score) held constant. Two additional statistical techniques were used with follow-up data which were categorical in nature. Where subject groups were of adequate size, chi square techniques were used. Where attrition over the two-year period precluded the use of chi square, Fisher's exact probability test was used (24).

The methodological information presented in this chapter is not intended to be all-encompassing and exhaustive. In addition to the material presented in this chapter to provide a general picture of the procedures used, certain methodological variations which are pertinent to problems arising in analyzing the data are presented in the two succeeding chapters where results of analyses are presented.

CHAPTER III

DIFFERENCES OBSERVED AT THE END OF TRAINING

There were two basically different approaches used in evaluating the experimental programs offered to school dropouts in this study. The first approach centered upon the measurement of achievement or changes which took place during the period in which subjects underwent training. Three types of variables were considered: (a) achievement in academic subject areas, (b) changes in social and psychological characteristics, and (c) achievement in vocational skill subject areas. Results of analyses involving these variables are presented in this chapter. The second general approach used in evaluating the experimental programs was a two-year follow-up study. Results from the follow-up study are presented in Chapter IV.

Differences in Academic Achievement

One major phase of the project was to include some academic training for two of the experimental groups. This training was in the areas of communication skills, mathematics, social studies, and science and was carried on in an individualized and nongraded approach. Students in the two experimental groups that received academic instruction were permitted to apply this credit toward a high school diploma. The results associated with this provision are discussed first. The major portion of this section, however, is reserved for the discussion of the results on academic achievement at the end of the training period. The major research question in this regard was:

> To what extent will the members of the Academic-Vocational group, the Vocational group, the Academic group, Control group I, and Control group II differ in terms of academic achievement?

Another question of concern was the relationship of certain social-psychological variables to academic achievement.

HIGH SCHOOL COMPLETION

It was arranged with the State Superintendent of Public Instruction that students in this project who were in the Academic-Vocational group and in the Academic group could apply all credits earned toward a high school diploma. Furthermore, if a student could not earn sufficient credit, he would be permitted to take the General Education Development Tests and, if successful, be granted a diploma. This provision, too, was restricted to members of these same groups.

Of the 74 students who completed the program in the Time I and Time II Academic-Vocational group, 53 received high school diplomas. Of the 34 students total in the Academic group, 25 received diplomas. Most of those who did not receive diplomas needed additional credits and, thus, should not be regarded as failing at this point.

Of the nine students who attempted the equivalency examinations, six were successful.

The possibility of earning a high school diploma was probably considered important by many students. This factor in the project was not included in a way that provided information for statistical analysis. One might speculate that a major effect would be its motivational value for the members of the Academic-Vocational group and the Academic group. But the results on academic achievement discussed subsequently in this chapter do not suggest such an effect on achievement test results.

Also there is the probability that some project participants were interested mainly in this possibility of earning the high school diploma and not necessarily in becoming employed. The evidence, though, permits only that the question be raised.

ADDITIONAL METHODOLOGY PERTAINING TO ACADEMIC ACHIEVEMENT

Since most of the students had a year or more of experience out of school, it was thought that a measure of achievement appropriate for them should be based on the idea of general educational development. Such a measure would take into account some learnings from experience not directly attributable to so-called "book learning." This was one of the main reasons why the project staff selected the *Sequential Tests of Educational Development* as the measure of educational achievement for the project. The STEP tests are designed as instruments measuring the broad outcomes of general education, rather than the relatively narrow results of any specific subject-matter course.

Most project participants had completed the ninth, tenth, and eleventh grades in about equal proportions. Since many of them were disadvantaged in ways over and beyond dropping out of school, the project staff decided to test at the ninth-grade level.

Mean Scores on Academic Achievement

Table 7 shows the mean posttest scores on the five STEP tests that were used in the project. These are raw scores indicating the number of questions answered correctly. The raw scores were used

TABLE 7. MEAN SCORES ON STEP TESTS

Group	Time I posttest mean	Time II posttest mean
Reading		
Academic-Vocational	52.04	45.94
Vocational	42.21	41.38
Academic	50.75	44.53
Control I	44.47	48.83
Control II	42.69	46.14
Writing		
Academic-Vocational	38.30	34.89
Vocational	31.52	30.00
Academic	40.15	34.67
Control I	37.40	35.83
Control II	32.23	34.71
Social Studies		
Academic-Vocational	48.57	39.44
Vocational	40.69	37.15
Academic	49.95	41.20
Control I	43.13	43.42
Control II	36.92	40.07
Mathematics		
Academic-Vocational	30.89	24.06
Vocational	27.62	19.92
Academic	30.65	24.93
Control I	24.33	26.33
Control II	24.00	27.86
Science		
Academic-Vocational	36.73	30.72
Vocational	31.57	27.72
Academic	37.90	33.87
Control I	29.87	32.58
Control II	30.85	29.14

throughout the analysis for Chapters III and IV because, in most instances, converted scores and transformed scores are of less benefit for purposes of statistical analysis.

However, a general notion of where these means stand in relation to the norm group of students may be of interest to the reader. In general, the upper limit of the percentile band for most of the higher means is around the 75th percentile and the lower limit of the percentile band for most of the lower means is around the 25th percentile. For example, the band for a science score of 36 ranges from the 47th to the 76th percentile. The percentile band for a science score of 30 ranges from the 24th to the 66th percentile. These percentile bands are for individuals--regular school students--in the ninth grade and are based on fall testing. The bands represent points of one standard deviation on either side of a given score. Thus, it would appear that this was about the appropriate level to test project participants.

As stated in Chapter II, the STEP tests were also administered as pretests. Pretest means are not shown in Table 7 because there was not sufficient advancement between pretest and posttest mean scores of groups to be statistically significant when analyzed by a _t_ test for related groups. The posttests provide the dependent variable measurements used in subsequent analyses.

Concomitant Variables in Analysis of Academic Achievement

At this point it is necessary to comment briefly on some of the statistical procedures described in Appendix D and their application to academic achievement.

It would appear that a basic assumption underlying multivariate analysis in the behavioral sciences is that there would be a unique set of variables contributing the highest predicting power of a given criterion measure under given circumstances. Initially, as described in Appendix D, both categorical predictor variables and continuous predictor variables were included in the statistical model. This would probably be a preferred procedure when three or more groups are to be compared on a criterion measure by use of an F test.

But if a posteriori tests of adjusted means of two groups at a time are desired after an F test, then it is necessary to restrict the concomitant variables to continuous predictor variables. This is so because the coefficients of categorical predictor variables are not the same as the beta coefficients of continuous predictor variables used in adjusting means. Since the project staff desired to make such a posteriori tests, the concomitant variables used in analyses reported in this chapter are of the continuous predictor type. In doing so, however, the set of concomitant variables used had essentially the same predicting power as if the categorical predictor variables had been included. A large portion of the reason why, at this stage of progress in the behavioral sciences, investigators do not arrive at a unique set of variables is that the measurements are so crude in the first instance.

Another condition required in ordinary covariance analysis is that the measure of the concomitant variables should not be influenced by treatments. Thus, throughout this project, all concomitant variables are pretest measures.

There was a total of 23 continuous-type predictor variables that could be used in the analyses reported in this chapter. They were obtained from the instruments described in Appendix C. Included were five STEP tests, five Kuder tests, eight aptitude measures from the General Aptitude Test Battery, RUO total score, SCVO total score, IPAT total score, CTP personal adjustment, and CTP social adjustment.

The decision as to which continuous predictor variables to use as concomitant variables was based upon one solution for each dependent variable when the values of 23 possible continuous predictor variables were inserted in linear mathematical Model number 1 described in Appendix D. Each continuous predictor variable that had a variance ratio significant at the .25 or higher probability level was then placed in the same program the second time. On this second run only the variables with a variance ratio at the .05 or higher probability level were retained for covariance analysis of treatment groups. This covariance analysis of treatment groups was performed in each instance by inserting the values for retained variables in Model number 3 as described in Appendix D. In this three-pass procedure it is possible that some concomitant variables will not be significant in the third pass. Each covariance table presents information on all the variables that were used in the third pass.

These are the conditions, then, under which the following discussion of academic achievement is made.

FINDINGS ON ACADEMIC ACHIEVEMENT

Time I and Time II findings for STEP reading test scores are shown in Table 8. The analysis for treatment groups shows no significance for either time. Subsumed in this analysis too, is the finding of no significant difference between the mean scores of the Academic-Vocational group and the Academic group.

TABLE 8. ANALYSIS OF COVARIANCE OF READING TEST SCORES

Source of variation	Adjusted sum of squares	*df*	Variance estimate	*F*
Time I				
Total	9962.32	145		
Treatment groups	246.34	4	61.58	1.23
Concomitant variables				
GATB verbal	614.52	1	614.52	12.14*
STEP reading	491.26	1	491.26	9.71*
STEP social studies	1303.36	1	1303.36	25.75*
CTP social adjustment	373.67	1	373.67	7.38*
Within	6933.17	137	50.61	
$R^2 = .70$				
Time II				
Total	4315.97	71		
Treatment groups	76.46	4	19.12	.40
Concomitant variables				
GATB form perception	168.70	1	168.70	3.54
GATB manual dexterity	342.91	1	342.91	7.20*
STEP reading	705.02	1	705.02	14.80*
STEP writing	75.56	1	75.56	1.58
STEP social studies	75.58	1	75.58	1.58
STEP mathematics	42.30	1	42.30	.89
Within	2905.90	61	47.64	
$R^2 = .70$				

*$p < .05$

The concomitant variables explaining significant amounts of the variation in both analyses are mostly verbal in nature. In both analyses the coefficient of determination was .70.

In the area of writing, there was a significant difference among Time I treatment group means but not among the means of Time II groups as indicated in Table 9. In further analysis of the Time I finding by the Sheffe' procedure shown in Table 10, the comparison between the Vocational group and Control group I approached significance. The difference in adjusted means between the Academic-Vocational group and Control group I suggests a value approaching a significant difference also. But by the same token, no significant difference between means is evident for the Academic-Vocational group and the Academic group, one of the combinations of special interest to the project staff.

The concomitant variables explaining significant amounts of the variation in treatment are again mostly verbal in nature. In the Time I analysis, the CTP social adjustment scale was significant and it appears again in several subsequent analyses. In the Time II analysis of writing scores, the SCVO total score was significant, the only occasion in which it was so in any of the analyses of academic achievement.

Table 11 shows the Time I and Time II analyses of social studies means with a significant difference for Time I groups only. Two-group comparisons in Table 12 indicate a significant difference between means of the Academic group and the Vocational group. It would appear that the difference between adjusted means of the Academic group and Control group II would also be significant but the small number of subjects in Control group II accounted for an _F_ value of 7.09 which is below the

TABLE 9. ANALYSIS OF COVARIANCE OF WRITING TEST SCORES

Source of variation	Adjusted sum of squares	*df*	Variance estimate	*F*
Time I				
Total	7922.26	145		
Treatment groups	437.09	4	109.27	2.82*
Concomitant variables				
GATB verbal	485.64	1	485.64	12.54*
GATB clerical perception	87.79	1	87.79	2.27
STEP writing	637.98	1	637.98	16.47*
STEP social studies	627.61	1	627.61	16.21*
CTP social adjustment	379.35	1	379.35	9.80*
Within	5266.80	136	38.74	
$R^2 = .72$				
Time II				
Total	3229.50	71		
Treatment groups	106.04	4	26.51	.92
Concomitant variables				
SCVO total	196.83	1	196.83	6.86*
GATB spatial aptitude	291.97	1	291.97	10.17*
GATB form perception	96.54	1	96.54	3.36
STEP reading	440.60	1	440.60	15.35*
STEP writing	91.62	1	91.62	3.19
STEP mathematics	245.69	1	245.69	8.56*
CTP personal adjustment	38.24	1	38.24	1.33
Within	1721.97	60	28.70	
$R^2 = .78$				

*$p < .05$

TABLE 10. COMPARISON OF ADJUSTED MEANS FOR WRITING, TIME I

Group	Unadjusted	Adjusted	Results of two-group comparisons: Groups compared[a]	F
Academic-Vocational	38.30	34.88	Vocational with Control I	7.29
Vocational	31.52	34.66		
Academic	40.15	37.68		
Control I	37.40	39.71		
Control II	32.23	37.96		

[a] For any difference to be significant at the .10 level, F must be equal to or greater than F' which for this table equals 7.96.

TABLE 11. ANALYSIS OF COVARIANCE OF SOCIAL STUDIES TEST SCORES

Source of variation	Adjusted sum of squares	df	Variance estimate	F
Time I				
Total	8021.92	145		
Treatment groups	445.03	4	111.26	3.23*
Concomitant variables				
GATB verbal	668.15	1	668.15	19.37*
STEP reading	334.79	1	334.79	9.71*
STEP social studies	1024.16	1	1024.16	29.69*
Kuder B	114.68	1	114.68	3.32
Kuder D	460.14	1	460.14	13.34*
CTP social adjustment	318.22	1	318.22	9.23*
Within	4656.75	135	34.49	
$R^2 = .74$				
Time II				
Total	11160.55	71		
Treatment groups	195.97	4	48.99	.76
Concomitant variables				
STEP social studies	6286.47	1	6286.47	97.59*
Kuder A	226.13	1	226.13	3.51
CTP personal adjustment	224.46	1	224.46	3.48
CTP social adjustment	169.33	1	169.33	2.63
Within	4058.19	63	64.42	
$R^2 = .66$				

*p <.05

TABLE 12. COMPARISON OF ADJUSTED MEANS
FOR SOCIAL STUDIES, TIME I

			Results of two-group comparisons	
Group	Unadjusted	Adjusted	Groups compared[a]	F
Academic-Vocational	48.57	45.07	Academic with Vocational	11.63
Vocational	40.69	43.02	Academic with Control II	7.09
Academic	49.95	48.46		
Control I	43.13	46.50		
Control II	36.92	42.89		

[a] For any difference to be significant at the .10 level, F must be equal to or greater than F' which for this table equals 7.96.

accepted value for this comparison.

In both time group analyses, the pretest social studies scores provided a large portion of the variation in each of the relationships. The Kuder scale, preference for avoiding conflict, was significant in the Time I analysis, the only instance in which it was significant in any of the academic achievement analyses.

In the area of mathematics, as indicated in Table 13, there were no significant differences among treatment means of either Time I or Time II groups.

There was a significant difference in science mean scores for Time I treatment groups and the F value for Time II groups approached significance. The F for each of the science group mean tests is given in Table 14, and, for Time II, the two-group comparisons are shown in Table 15. The adjusted mean science score for the Academic group differed significantly from that of the Vocational group and that of

Control group I.

The over-all findings associated with academic achievement by the various subject groups are summarized at the end of this chapter.

TABLE 13. ANALYSIS OF COVARIANCE OF MATHEMATICS TEST SCORES

Source of variation	Adjusted sum of squares	df	Variance estimate	F
Time I				
Total	6432.05	145		
Treatment groups	38.24	4	9.56	.34
Concomitant variables				
GATB numerical	665.16	1	665.16	23.79*
GATB spatial	285.20	1	285.20	10.21*
GATB finger dexterity	157.15	1	157.15	5.62*
STEP mathematics	1284.17	1	1284.17	45.93*
CTP social adjustment	200.00	1	200.00	7.15*
Within	3802.13	136	27.96	
$R^2 = .70$				
Time II				
Total	3107.22	71		
Treatment groups	198.49	4	49.62	1.54
Concomitant variables				
STEP mathematics	656.69	1	656.69	20.33*
STEP science	152.11	1	152.11	4.71*
Within	2099.93	65	32.31	
$R^2 = .63$				

*$p < .05$

TABLE 14. ANALYSIS OF COVARIANCE OF SCIENCE TEST SCORES

Source of variation	Adjusted sum of squares	*df*	Variance estimate	*F*
Time I				
Total	5768.67	145		
Treatment groups	373.52	4	93.38	3.53*
Concomitant variables				
RUO total	449.16	1	449.16	16.99*
GATB verbal	549.26	1	549.26	20.77*
GATB motor coordination	114.40	1	114.40	4.33*
STEP reading	99.95	1	99.95	3.78
STEP writing	167.33	1	167.33	6.33*
STEP social studies	165.19	1	165.19	6.25*
STEP science	306.92	1	306.92	11.61*
Within	3542.95	135	26.44	
$R^2 = .67$				
Time II				
Total	3047.56	71		
Treatment groups	281.56	4	70.39	2.37
Concomitant variables				
GATB numerical	175.55	1	175.55	5.90*
GATB clerical perception	99.84	1	99.84	3.36
STEP social studies	483.03	1	483.03	16.23*
STEP mathematics	122.47	1	122.47	4.12*
STEP science	43.78	1	43.78	1.47
IPAT total	26.43	1	26.43	.88
Within	1814.90	61	29.75	
$R^2 = .67$				

$^*p < .05$

TABLE 15. COMPARISON OF ADJUSTED MEANS
FOR SCIENCE, TIME I

Group	Unadjusted	Adjusted	Results of two-group comparisons Groups compared[a]	 F
Academic-Vocational	36.73	34.53	Academic with Vocational	12.35
Vocational	31.57	32.47	Academic with Control I	7.98
Academic	37.90	37.38		
Control I	29.87	32.42		
Control II	30.85	35.28		

[a] For any difference to be significant at the .10 level, F must be equal to or greater than F' which for this table equals 7.96.

Differences in Social-Psychological Characteristics

The problem that is considered in this section is that of determining the extent to which training received during the project was accompanied by changes in the social and psychological characteristics of participating individuals. It would seem plausible that individuals such as the ones who underwent training in this program, as a consequence of learning marketable skills, interacting with peers and instructors in a structured setting, and/or reaching a specific goal related to achievement needs, might be different socially and emotionally at the conclusion of this program than they were at the beginning of it. The major research question in this regard was:

> To what extent will the members of the Academic-Vocational group, the Vocational group, the Academic group, Control group I and Control group II differ at the end of the training period in terms of social and psychological characteristics?

ADDITIONAL METHODOLOGY FOR ASSESSMENT OF SOCIAL-PSYCHOLOGICAL CHARACTERISTICS

In order to examine the above question, pretests and posttests were administered to all of the experimental groups who participated in the training program, as well as to the control groups. The instruments used in this phase of the evaluation were: (a) *The Kuder Preference Record-Personal*, (b) *The California Test of Personality, Secondary Form*, (c) *The IPAT Anxiety Scale Questionnaire*, (d) *The Social Class Value Orientation Inventory*, and (e) *The Rural-Urban Orientation Inventory*. These tests, described in detail in Appendix C, were administered along with an achievement and aptitude battery and used in other phases of the evaluation. The tests were administered in the same Time I and Time II periods as the other tests because of the differing completion dates for subjects in some of the vocational training programs.

In the case of the *Kuder Preference Record-Personal* and the *California Personality Test*, subtest rather than total test scores were used as the measure of the dependent variable. In fact, the Kuder instrument does not give any overall or total score so the various subtest scores represent the only meaningful results of this instrument. Thus, each of the five subtests of the Kuder was used as a separate measure of a dependent variable.

From the *California Test of Personality*, on the other hand, it is possible to obtain twelve separate subtest scores. In each of the twelve subtests, however, there are only fifteen items. Because of the problems of reliability in using scales with such a limited sample of items, the two major composite subscores of the test, those for personal adjustment and for social adjustment were used. Each of these two general factors are measured by 90 test items and have been shown to have sufficient reliability to justify their use for research purposes.

Another instrument used in the study is the _IPAT Anxiety Scale_ which consists of forty items. On this test it is possible to obtain five part scores, each of which is a measure of an anxiety component within the personality constellation. The reliability coefficients reported for the total test are considerably higher than subtest coefficients, however, and for the purpose of this analysis it was decided to use only the total anxiety score.

The two other instruments used are the _Rural-Urban Orientation Inventory_ and the _Social Class Value Orientation Inventory_, both of which are experimental devices being developed at Oklahoma State University. The information currently available as to the reliability of these scales is incorporated in Appendix C of this report.

Answers were sought for three basic questions regarding changes of a social-psychological nature which may have occurred as a result of training. The first question refers to changes which were assessed by comparing pretest and posttest results within each of the treatment groups used in the study. Such change would reflect the effects of the operation of a specific training context on the individuals who received that particular type of training. This procedure provides an indication of how a specific program affected individuals who were participants in that program. However, this procedure does not indicate the extent of the effects of a specific type of training in relation to other types of training or in relationship to no training. Assessment of differences of the latter sort were made through the use of the analysis of covariance described in previous sections of this report.

With this design it was possible to test for differences between groups at the end of training and at the same time to control for initial differences between the groups on a variety of concomitant variables, including initial differences on each dependent variable under study.

The third question dealt with in this section concerns the degree to which changes may have occurred as a function of the varying length of training provided in the respective vocational training programs. An attempt was made to control and examine the effects of this time lapse by testing a randomly selected portion of the Academic group and the control groups at an intermediate point during the training period. Results of these Time I tests were compared with results of tests from the Academic-Vocational and the Vocational groups whose programs were concluded at intermediate points. The remainder of the Academic group and control groups provided data for comparisons with Academic-Vocational and Vocational groups whose skill programs extended over a longer period of time. Time II is the designation given to the later testing period.

FINDINGS ON PRETEST-POSTTEST DIFFERENCES IN SOCIAL-PSYCHOLOGICAL CHARACTERISTICS

The statistical procedure used to test for significant differences between pretest and posttest performances for personal and social characteristics was the correlated _t_ test. This analysis was done for all of the dependent measures used in this phase of the study. The results of these analyses reveal that with the exception of the personal adjustment scores on the _California Test of Personality_, none of the differences between means on any of the instruments were significant at the .05 level. For this reason, only the data for pretest-posttest comparisons on the California Test of Personality are shown.

Table 16 gives the California Test of Personality, personal adjustment mean scores for the Time I and Time II periods. In the Time I period, significant differences between pretest and posttest means were found for the Academic-Vocational group and for Control group I. A significant difference was also found on the same subtest of the California Test of Personality at the Time II period. In this case, however, the change is found between the pretest and posttest performance of the Academic group. The differences for both control groups are also large but do not approach statistical significance.

TABLE 16. PRETEST-POSTTEST COMPARISONS OF PERSONAL ADJUSTMENT SCORES FROM THE CALIFORNIA TEST OF PERSONALITY

Subject group	Posttest mean	Pretest mean	t
Time I, Academic-Vocational	68.91	62.71	2.70*
Time I, Vocational	66.24	60.95	1.77
Time I, Academic	66.75	65.20	.41
Time I, Control I	67.40	55.13	2.55*
Time I, Control II	67.92	62.39	.85
Time II, Academic-Vocational	62.50	63.89	-.32
Time II, Vocational	66.15	63.77	.48
Time II, Academic	69.47	60.00	2.13*
Time II, Control I	62.33	55.58	1.07
Time II, Control II	65.71	59.64	1.36

*$p < .05$

Shown in Table 17 are the mean scores on social adjustment from the California Test of Personality. Pretest and posttest means are shown both for Time I and Time II subject groups. In no case was there a significant difference between pretest and posttest scores. The data in Table 17 are provided to aid in interpreting a significant difference to be reported later among the Time I groups in terms of their social adjustment scores.

TABLE 17. PRETEST-POSTTEST COMPARISONS OF SOCIAL ADJUSTMENT SCORES FROM THE CALIFORNIA TEST OF PERSONALITY

Subject group	Posttest mean	pretest mean	*t*
Time I, Academic-Vocational	69.55	69.66	.053
Time I, Vocational	63.62	64.91	.46
Time I, Academic	73.20	70.50	.97
Time I, Control I	68.33	65.73	.72
Time I, Control II	71.39	64.08	1.15
Time II, Academic-Vocational	64.83	68.50	-.86
Time II, Vocational	68.69	67.54	.22
Time II, Academic	69.80	65.33	1.04
Time II, Control I	68.75	64.25	.69
Time II, Control II	67.21	63.36	.82

DIFFERENCES AMONG GROUPS ON SOCIAL-PSYCHOLOGICAL CHARACTERISTICS

In order to determine if there were significant differences at the conclusion of training among the various treatment groups on any of the social-psychological variables, analysis of covariance techniques were used. The procedures followed were the same as those described earlier for assessing differences in academic achievement.

Kuder Preference Record

The results of the covariance analyses for both Time I and Time II units are shown in Tables 18 through 22 along with the concomitant variables controlled in each analysis. No significant differences were found on any of the different subtests of the Kuder instrument among the several experimental and control groups.

IPAT Anxiety Scale

Table 23 gives the results of a similar analysis using the _IPAT Anxiety Scale_. These results indicate that there are no significant differences among the five subject groups. These differences in the Time I unit are, however, large enough to approach significance at the .05 level. Consequently, if we look at the differences between adjusted means we find that they are quite large in certain cases. Interestingly enough, these means are higher for the experimental groups than for the controls. (A high score on this test indicates a higher anxiety level.)

Rural-Urban and Social Class Values Orientations

Results shown in Tables 24 and 25 indicate that there were no significant differences between the various treatment groups on the measure of their _Rural-Urban Orientation_ or of their _Social Class Values Orientation_.

TABLE 18. ANALYSIS OF COVARIANCE OF KUDER A TEST SCORES

Source of variation	Adjusted sum of squares	df	Variance estimate	F
Time I				
Total	12739.00	145		
Treatment groups	89.47	4	44.41	.50
Concomitant variables				
GATB numerical	985.86	1	985.86	22.19*
GATB finger dexterity	126.06	1	126.06	2.83
Kuder A	4918.36	1	4918.36	110.72*
Kuder B	224.67	1	224.67	5.05*
CTP personal adjustment	353.58	1	353.58	7.96*
Within	6041.00	136	44.42	
$R^2 = .60$				
Time II				
Total	8057.12	71		
Treatment groups	16.57	4	4.14	.07
Concomitant variables				
SCVO total	350.19	1	350.19	6.34*
STEP writing	409.49	1	409.49	7.41*
Kuder A	2972.37	1	2972.37	5.37*
Kuder B	564.31	1	564.31	10.21*
CTP personal adjustment	317.31	1	317.31	5.74*
Within	3426.88	62	55.27	
$R^2 = .69$				

*$p < .05$

TABLE 19. ANALYSIS OF COVARIANCE OF KUDER B TEST SCORES

Source of variation	Adjusted sum of squares	df	Variance estimate	F
Time I				
Total	9027.85	145		
Treatment groups	186.30	4	46.57	1.31
Concomitant variables				
GATB spatial	127.02	1	127.02	3.58*
Kuder B	3571.09	1	3571.09	100.78*
Kuder C	253.62	1	253.61	7.16*
Within	4889.82	138	35.43	
$R^2 = .47$				
Time II				
Total	5958.68	71		
Treatment groups	165.42	4	41.35	1.25
Concomitant variables				
STEP reading	295.77	1	295.77	9.01*
Kuder B	3258,46	1	3258.46	99.23*
CTP social adjustment	137.44	1	137.44	4.19*
Within	2101.59	64	32.83	
$R^2 = .65$				

*$p < .05$

TABLE 20. ANALYSIS OF COVARIANCE OF KUDER C TEST SCORES

Source of variation	Adjusted sum of squares	df	Variance estimate	F
Time I				
Total	9705.51	145		
Treatment groups	32.80	4	8.20	.25
Concomitant variables				
Kuder C	4927.78	1	4927.78	151.69*
IPAT total anxiety	229.52	1	229.52	7.07*
Within	4515.41	139	32.48	
$R^2 = .54$				
Time II				
Total	4977.49	71		
Treatment groups	49.32	4	12.33	.38
Concomitant variables				
GATB manual dexterity	100.15	1	100.15	3.12
Kuder C	2741.39	1	2741.39	85.40*
Within	2086.64	65	32.10	
$R^2 = .57$				

*$p < .05$

TABLE 21. ANALYSIS OF COVARIANCE OF KUDER D TEST SCORES

Source of variation	Adjusted sum of squares	df	Variance estimate	F
Time I				
Total	14717.59	145		
Treatment groups	190.88	4	47.72	1.1
Concomitant variables				
GATB manual dexterity	336.26	1	336.26	7.74*
STEP social studies	209.22	1	209.22	4.82*
Kuder B	281.46	1	281.46	6.48*
Kuder D	7127.05	1	7127.05	164.21*
Kuder E	227.04	1	227.04	5.23*
CTP personal adjustment	121.91	1	121.91	2.81
CTP social adjustment	407.93	1	407.93	9.39*
Within	5815.84	134	43.40	
$R^2 = .75$				
Time II				
Total	5701.53	71		
Treatment group	86.69	4	21.67	.40
Concomitant variables				
GATB clerical	135.34	1	135.34	2.47
Kuder D	4628.14	1	4628.14	84.49*
CTP social adjustment	412.82	1	412.82	7.54*
IPAT total anxiety	438.54	1	438.54	8.06*
Within	3451.04	63	54.77	
$R^2 = .69$				

$*p < .05$

TABLE 22. ANALYSIS OF COVARIANCE OF KUDER E TEST SCORES

Source of variation	Adjusted sum of squares	df	Variance estimate	F
Time I				
Total	13008.82	145		
Treatment groups	166.03	4	41.50	.99
Concomitant variables				
GATB numerical	571.96	1	571.95	13.71*
GATB finger dexterity	158.34	1	158.34	3.79
STEP writing	375.14	1	375.14	8.99*
Kuder A	456.46	1	456.46	10.94*
Kuder D	871.91	1	871.91	20.90*
Kuder E	4777.11	1	4777.11	114.51*
Within	5631.87	135	4171.76	
$R^2 = .69$				
Time II				
Total	7342.96	71		
Treatment groups	503.16	4	125.79	2.21
Concomitant variables				
Kuder E	3076.09	1	3076.09	53.94*
Within	3763.71	66	570.25	
$R^2 = .49$				

* $p < .05$

TABLE 23. ANALYSIS OF COVARIANCE OF IPAT TEST SCORES

Source of variation	Adjusted sum of squares	df	Variance estimate	F
Time I				
Total	10392.00	145		
Treatment group	470.48	4	117.62	2.36
Concomitant variables				
CTP personal adjustment	2393.25	1	2393.25	48.05*
IPAT total anxiety	605.72	1	605.72	12.16*
Within	6922.55	139	49.80	
$R^2 = .54$				
Time II				
Total	8943.90	71		
Treatment group	214.42	4	53.61	.78
Concomitant variables				
STEP mathematics	704.73	1	704.73	10.26*
IPAT total anxiety	3562.51	1	3562.51	51.89*
Within	4462.24	65	68.65	
$R^2 = .51$				

*$p < .05$

TABLE 24. ANALYSIS OF COVARIANCE OF RURAL-URBAN ORIENTATION SCORES

Source of variation	Adjusted sum of squares	df	Variance estimate	F
Time I				
Total	1454.22	145		
Treatment groups	29.19	4	7.29	1.01
Concomitant variables				
RUO total	355.57	1	355.57	49.45*
STEP science	26.32	1	26.32	3.66
Kuder B	50.86	1	50.86	7.07*
Within	992.28	138	7.19	
$R^2 = .32$				
Time II				
Total	767.10	71		
Treatment group	15.44	4	3.86	.55
Concomitant variables				
RUO total	180.48	1	180.48	25.86*
GATB form perception	19.97	1	19.97	2.86
Kuder B	70.84	1	70.84	10.15*
CTP personal adjustment	40.67	1	40.67	5.83*
Within	439.70	63	6.98	
$R^2 = .42$				

*$p < .05$

TABLE 25. ANALYSIS OF COVARIANCE OF SOCIAL CLASS VALUES ORIENTATION SCORES

Source of variation	Adjusted sum of squares	df	Variance estimate	F
Time I				
Total	1228.46	145		
Treatment groups	19.28	4	4.82	.79
Concomitant variables				
SCVO total	203.84	1	203.84	33.39*
GATB numerical	33.17	1	33.17	5.43*
STEP reading	22.07	1	22.07	3.61
STEP social studies	31.56	1	31.56	5.17*
CTP social adjustment	88.20	1	88.20	1.44
Within	830.34	136	6.11	
$R^2 = .54$				
Time II				
Total	722.85	71		
Treatment groups	67.00	4	16.75	2.31
Concomitant variables				
RUO total	20.21	1	20.21	2.79
SCVO total	104.11	1	104.11	14.35*
CTP social adjustment	67.26	1	67.26	9.27*
Within	464.27	64	7.25	
$R^2 = .49$				

*$p < .05$

California Test of Personality

There were significant differences among the subject groups in terms of their performance on the California Test of Personality. These differences were found in the overall social adjustment subtest for the Time I group, as shown in Table 26. Significant differences also were found on the California Test of Personality for the Time II unit. These differences occurred, however, on the personal adjustment subtest and not on the social adjustment subtest. These results are shown in Table 27.

Following the finding of significant differences among subject groups on California Test of Personality scores, additional tests utilizing the Scheffe' procedure were used to determine which of the groups differed. Table 28 shows the adjusted means of each of the Time I groups for California Test of Personality social adjustment and the results of the Sheffe' procedure. Significant differences are shown at the .10 level. At this probability level, differences are found between the Vocational group and Control group II. It should be noted that Control group II has the highest adjusted mean score. This is an interesting finding since Control group II includes those individuals who, for various reasons, dropped out of the training program before receiving 15 percent of the program. Further consideration should be given to possible reasons why these individuals scored higher on a measure of social adjustment at the end of the time elapsed for the completion of this program than the individuals who remained in training.

Table 29 shows the results of Scheffe' tests to determine which of the Time II groups differed significantly in terms of personal

TABLE 26. ANALYSIS OF COVARIANCE CTP SOCIAL ADJUSTMENT SCORES

Source of variation	Adjusted sum of squares	df	Variance estimate	F
Time I				
Total	11388.44	145		
Treatment group	661.09	4	165.27	2.68*
Concomitant variables				
Kuder D	267.82	1	267.82	4.34*
CTP personal adjustment	536.35	1	536.35	8.70*
CTP social adjustment	1414.45	1	1414.45	22.94*
Within	8508.73	138	61.66	
$R^2 = .57$				
Time II				
Total	10760.56	71		
Treatment group	519.94	4	147.99	2.32
Concomitant variables				
STEP writing	99.26	1	99.26	1.56
STEP science	249.85	1	249.85	3.92
Kuder C	667.89	1	667.89	10.48*
CTP social adjustment	5209.97	1	5209.65	81.77*
Within	4013.65	63	63.71	
$R^2 = .67$				

*$p < .05$

TABLE 27. ANALYSIS OF COVARIANCE CTP
PERSONAL ADJUSTMENT SCORES

Source of variation	Adjusted sum of squares	df	Variance estimate	F
Time I				
Total	14449.34	145		
Treatment groups	498.86	4	124.71	1.74
Concomitant variables				
CTP personal adjustment	3337.36	1	3337.36	46.64*
CTP social adjustment	666.64	1	666.64	9.32*
Within	9946.48	139	71.58	
$R^2 = .59$				
Time II				
Total	5962.75	71		
Treatment groups	724.71	4	182.43	3.92*
Concomitant variables				
STEP reading	351.64	1	351.64	7.55*
STEP writing	227.89	1	227.89	4.89*
CTP personal adjustment	1346.20	1	1346.20	28.90*
CTP social adjustment	372.61	1	372.61	8.00*
Within	2934.70	63	46.58	
$R^2 = .72$				

*$p < .05$

TABLE 28. COMPARISON OF ADJUSTED MEANS CTP SOCIAL ADJUSTMENT TIME I

Group	Unadjusted	Adjusted	Results of two group comparisons: Groups compared[a]	F
Academic-Vocational	69.55	68.35	Control II with Vocational	8.22
Vocational	63.62	65.54		
Academic	73.20	70.41		
Control I	68.33	70.03		
Control II	71.39	72.69		

[a] For any difference to be significant at the .10 level, F must be equal to or greater than F' which for this table equals 7.96.

TABLE 29. COMPARISON OF ADJUSTED MEANS FOR CTP PERSONAL ADJUSTMENT TIME II

Group	Unadjusted	Adjusted	Results of two group comparisons: Groups compared[a]	F
Time II, Academic-Vocational	62.50	60.89	Academic with Academic-Vocational	15.19
Time II, Vocational	66.15	63.81		
Time II, Academic	69.47	70.18		
Time II, Control I	62.33	66.06		
Time II, Control II	65.71	66.00		

[a] For any difference to be significant at the .10 level, F must be equal to or greater than F' which for this table equals 7.96.

adjustment scores. The Academic-Vocational group was exceeded by the Academic group on this measure.

Findings associated with differences in social-psychological characteristics are summarized at the end of this chapter with those relating to achievement in academic and in vocational training.

Achievement in Vocational Training

The research objective of this phase of the study was to determine whether vocational students would attain a different level of achievement in their respective skill areas if their skill training was accompanied by academic training as opposed to being offered alone. This question is essentially the reciprocal of the first question considered in this chapter, namely, whether academic achievement is affected if the academic program is accompanied by vocational training. Formally stated, the research question is:

> To what extent will the individuals who received both academic and vocational training and those who received only vocational training differ in terms of vocational achievement?

ADDITIONAL METHODOLOGY PERTAINING TO VOCATIONAL ACHIEVEMENT

For purposes of assessing achievement in vocational courses, two types of evaluation were conducted. First, students in each of the nine skill programs were rated by their respective teachers at the end of the training program. In all cases, the basis for ratings were lists of skills which the teachers expected their respective students to master during training. Students were rated on the extent to which they could perform the specified basic operations in their skill area. The total score derived from the rating form is referred to as the student's performance rating.

A second measurement of achievement was obtained by means of objective paper-and-pencil tests described in Appendix C. A different examination was, of course, used for each of the different vocational programs. The tests which were utilized and the dates of their administration are shown in Table 5 in Chapter II of this report. Also shown in Table 5 are the numbers of students in each skill training program who did and who did not receive academic training in conjunction with the vocational training. Performance ratings were given on the same numbers of students and on approximately the same dates as those shown in Table 5.

Two types of statistical analyses were carried out both for the performance ratings and for the objective test results on vocational achievement. Results obtained by each of the two methods of evaluation were first analyzed separately for the nine different vocational courses which were offered. However, because some training groups were too small to permit meaningful interpretations separately, a second set of analyses was carried out in which the results for all female subjects were in one group and those for all male subjects were in a second group. The combining of results from the different testing instruments and from the different rating scales was made possible by converting the results for each vocational program separately to z scores. Through this procedure the scores from the various tests and from the various rating scales were placed on equivalent bases, with the distribution of scores from each test and each rating scale having a mean of zero and a standard deviation of one. For the training groups with more than one objective test score, an average z score was computed for each student.

The statistical test utilized with all of the vocational achievement data was the Mann-Whitney U test. The probability level selected for statistical significance was .05, with all tests being two-tailed.

COMPARISONS OF PERFORMANCE RATINGS

Table 30 presents the results of statistical comparisons of performance rating scores for the nine separate skill programs, for male and for female students, and for all of the students combined. Since the basis for the Mann-Whitney U test is the rankings of students, the average rank for each of the groups involved in a comparison is shown with the numbers of students included. U values are shown at the right in Table 30.

In examining the average rank columns in Table 30, it appears that the academic-vocational students ranked slightly higher in skill performance ratings than their vocational counterparts in five of the nine skill programs and in all three of the combined classifications shown at the bottom of the table. However, in three vocational programs (Sheet Metal Worker, Non-Negro Cosmetology, and Auto Mechanics) vocational students ranked higher on the average than did academic-vocational students. In one skill area (Stenography), the same average ranking was given to both types of students. On the basis of these findings, at least a moderate trend is suggested favoring the students who received both academic and vocational training. However, results of the Mann-Whitney U test shown at the right in Table 30 indicated that none of the differences are significant at or below the .05 probability level. In one skill area (General Office Clerk) the difference in rankings of academic-vocational and vocational students approaches significance at the .05 level. In all other comparisons, there was

TABLE 30. RESULTS OF ANALYSES OF SKILL PERFORMANCE RATINGS FOR ACADEMIC-VOCATIONAL AND VOCATIONAL STUDENTS

Skill program	Number of students		Average rank		*U*
	Academic-Vocational	Vocational	Academic-Vocational	Vocational	
General Office Clerk	19	5	13.9	7.2	21
Machine Tool Operator	9	6	8.6	7.2	32
Stenographer	12	6	9.5	9.5	36
Welder, Combination	6	12	10.4	9.0	30.5
Office Machine Service	5	5	5.8	5.2	11
Sheet Metal Worker	2	3	2.5	3.3	4
Cosmetology, Negro	9	4	7.5	5.9	13.5
Cosmetology, Non-Negro	6	3	4.3	6.3	5
Auto Mechanic	2	5	2.5	4.6	2
All males	24	31	28.1	27.9	37.5
All females	46	18	33.8	29.2	35.4
Total	70	49	61.7	57.5	1833.5

greater than a ten percent probability that differences of the magnitude observed could occur by chance alone. Thus, it is concluded that there is essentially no difference in the performance ratings given to the two types of students. It is not possible to say with a high degree of certainty that either type of training program shows a repeatable advantage over the other in terms of skill performance ratings assigned at the end of training by the respective vocational instructors.

COMPARISONS OF OBJECTIVE VOCATIONAL TEST SCORES

Shown in Table 31 are the results of comparisons involving objective vocational test scores for the nine separate skill programs, for male and for female students, and for all of the students combined. The format of Table 31 is identical to that of Table 30 except for two skill programs--General Office Clerk and Stenographer. In all except these two programs, it was assumed that pretests would be unnecessary in that students would have little if any working knowledge or skill prior to entering the program. However, pretests as well as posttests were administered to General Office Clerk and Stenographer trainees, and the results shown for these two groups in Table 31 are based on gains from pretest to posttest. Results for all other groups are based on posttests only. It can also be noted in Table 31 that General Office Clerk and Stenographer trainees each completed more than one achievement test.

Viewing the results for each of the nine vocational courses separately, it again appears that inclusion or exclusion of academic training made little if any difference in the achievement of students in vocational courses. Only in the Machine Tool Operator course did the

TABLE 31. RESULTS OF ANALYSES OF OBJECTIVE VOCATIONAL TEST SCORES FOR ACADEMIC-VOCATIONAL AND VOCATIONAL STUDENTS

	Number of students		Average rank		
Skill program	Academic-Vocational	Vocational	Academic-Vocational	Vocational	U
General Office Clerk	19	5			
Typing			12.3	13.3	43.5
Office Skills			12.5	12.5	47.5
Machine Tool Operator	9	6	9.7	6.5	12
Stenographer	12	6			
Typing			8.5	11.4	24.5
Office Skills			10.1	8.2	28.5
Shorthand			10.2	8.0	27
Welder, Combination	5	12	12.0	8.2	21
Office Machine Service	5	5	5.9	5.1	10.5
Sheet Metal Worker	2	3	3.5	2.7	2
Cosmetology, Negro	9	4	5.9	9.4	8.5
Cosmetology, Non-Negro	6	3	4.5	6.0	6
Auto Mechanic	2	5	4.5	3.8	4
All males	24	31	33.9	23.4	229.5*
All females	46	18	30.9	36.6	340.5
Total	70	49	62.7	56.1	1524.5

*$p < .05$

difference in achievement rankings between Academic-Vocational and Vocational students approach statistical significance at the .05 level. However, it may be noted that in each of the five programs made up of males (Machine Tool Operator, Welder, Office Machine Service, Sheet Metal Worker, and Auto-Mechanic) Academic-Vocational students ranked higher on the average than their Vocational counterparts. This is in striking contrast to the results shown for the four courses which were for female students. In each case, female Vocational students outranked their Academic-Vocational counterparts on at least one objective measure of vocational achievement.

Pooling the results of objective vocational testing for males, a significant difference was found favoring the Academic-Vocational group. Despite a consistent tendency in the opposite direction, the difference between female Academic-Vocational and Vocational students did not approach statistical significance at the .05 level.

On the basis of the results presented in Tables 30 and 31, it is concluded that when achievement in vocational training was measured on objective tests, scores for males in the Academic-Vocational program exceeded those for males who received only vocational training. There was no difference between the two programs when achievement was assessed in terms of skill performance ratings given by instructors. There was a tendency for female Academic-Vocational students to out-rank their Vocational counterparts when rated by instructors, but to be outranked by them on objective test scores. However, in neither case did the difference between female groups approach statistical significance.

Summary of Differences Observed at the End of Training

In this chapter, findings have been presented in relation to three of the major questions which were considered in this investigation. These questions were concerned with the effects of three experimental treatments upon (a) academic achievement (b) changes in social-psychological characteristics, and (c) achievement in vocational skill training. The principal findings presented in this chapter may be summarized as follows:

(a) In no case did the academic achievement scores of the Academic-Vocational group and the Academic group differ significantly.

(b) At the end of the Time I period, the Academic group scored significantly higher on achievement tests in science and in social studies than did the Vocational group, and significantly higher in science than subjects in Control group I.

(c) At the end of the Time II period, there were no statistically significant differences among the subject groups on any of the academic achievement measures utilized in this study.

(d) Of 23 possible concomitant variables, about one-third remained in the multiple regression-covariance analysis for more than one of the ten comparisons which were made for academic achievement. They were pretest scores on the STEP tests, the GATB verbal score, and the CTP social adjustment score. Interest patterns, rural-urban orientation, social class values orientation, personal adjustment, anxiety, and other aptitudes measured by the GATB tests did little or nothing to help explain variation in academic achievement.

(e) The coefficients of determination of the concomitant variables in the ten analyses of covariance that were made for academic achievement ranged from .63 to .78. These coefficients represent multiple correlations of .80 and higher.

(f) High school diplomas were obtained by 72 percent of the participants who received academic training (either alone or in combination with vocational training) and, thus, were eligible to seek the diploma.

(g) Statistically significant pretest-posttest differences were found on only one of the measures used to assess social-psychological characteristics. On personal adjustment, posttest scores were significantly higher than pretest scores for the Time I Academic-Vocational group, the Time I Control group I, and the Time II Academic group.

(h) At the end of the Time I period, social adjustment scores of the Vocational group were exceeded significantly by those of Control group I.

(i) At the end of the Time II period, personal adjustment scores of the Vocational group were exceeded significantly by those of the Academic group.

(j) Of the 23 possible concomitant variables, 17 remained in the analysis for more than one of the twenty comparison of social-psychological characteristics carried out with covariance techniques. Variables which remained in five or more of the analyses were social adjustment (_California Test of Personality_), personal adjustment (_California Test of Personality_), and preference for familiar and stable situations (_Kuder_, B). Variables which least frequently remained in analyses were mathematics, as measured by the _Sequential Tests of Educational Progress_, and five aptitude scores from the _General Aptitude Test Battery_: verbal, spatial, form perception, clerical, and motor coordination.

(k) The coefficients of determination of the concomitant variables in the twenty analyses of covariance that were made for social-psychological characteristics ranged from .32 to .75, with a median of .57. These coefficients represent multiple correlations of from .56 to .86.

(l) Utilizing a nonparametric statistical procedure, the Mann-Whitney _U_ test, male subjects in the Academic-Vocational group were found to significantly exceed those in the Vocational group on objective vocational achievement test scores. However, the groups did not differ significantly in terms of vocational skill performance ratings assigned by instructors.

(m) There was no significant difference between female Academic-Vocational and Vocational groups, either on vocational achievement test scores or on vocational skill performance ratings assigned by instructors.

(n) When data were analyzed independently for the nine separate vocational skill classes, no significant differences were found between Academic-Vocational and Vocational subgroups, either on objective vocational achievement test scores or on vocational skill performance ratings assigned by instructors.

CHAPTER IV

DIFFERENCES OBSERVED DURING A TWO-YEAR FOLLOW-UP PERIOD

The primary objective in conducting the follow-up study was to determine whether members of the various experimental and control groups achieved differing degrees of job success during the first two years after training was completed. Formally stated, the principal research question dealt with in this phase of the study was:

> To what extent will the members of the various groups differ in terms of job placement history and job success over a two-year follow-up period?

Also of interest was the extent to which participants from the various groups continued their education or training and the extent of their general satisfaction with life as they experienced it during the two year period.

In the follow-up study, job success was judged in terms of four classes of variables: employment, income, job satisfaction, and employer ratings.

Additional Methodology Pertaining to the Follow-up Study

In this chapter of the report, results are presented of a follow-up study of participants during the first year after training and again during the second year after training. For certain summary analyses, information obtained during the first and second years are combined. As was explained in Chapter II, the Time I and Time II designations were dropped in the follow-up study, and the two control groups were combined into one. Thus, the follow-up study deals with only four basic groups--three experimental groups and one control group. However, because employment patterns for women differ dramatically from those for men, results for the two sexes were analyzed separately on all follow-up variables involving employment and income from employment.

In addition to removing variation due to sex by means of separate analyses, variation due to possible group differences in general intelligence was controlled through analysis of covariance techniques in all cases where parametric tests were possible. Data relating to labor market entry, continuation of schooling, and satisfaction with life were dichotomous in nature and were analyzed by chi square or Fisher's exact probability techniques. When using these statistical techniques, variation due to general intelligence was not removed.

In the follow-up study, efforts were made to contact all of the experimental and control group subjects who were posttested at the end of the training periods described in Chapter II. For certain specified analyses, all of the subjects contacted in the follow-up are included. These analyses are: labor market entry, weeks of employment, total earnings from employment, continuation of education, and satisfaction with life. The total number of subjects posttested in each subject group are shown in Table 32 along with the number in each group who provided data for the first and second year of follow-up. Also shown in Table 32 is the number of students in each group for whom a continuous two-year set of follow-up data were obtained.

For three additional variables it was essential that subjects be employed as of the time follow-up data were collected. These variables were hourly pay, job satisfaction, and employer ratings. Data for each of these three variables were analyzed as of the twelfth and twenty-fourth months of the follow-up period. Table 33 shows the number of contacted subjects in each group who were found to be employed as of the twelfth and twenty-fourth months.

TABLE 32. NUMBER OF SUBJECTS PROVIDING DATA

Subject groups	Total posttested at end of training period	Number of subjects providing follow-up data: First year	Second year	Both first and second year
Academic-Vocational	74	62	63	56
Vocational	55	41	41	38
Academic	34	31	27	26
Control	54	45	36	34
Total	217	179	167	154

TABLE 33. NUMBER OF CONTACTED SUBJECTS WHO WERE FOUND TO BE EMPLOYED

Subject groups	Number of subjects employed: As of 12th month	As of 24th month
Academic-Vocational	38	33
Vocational	29	30
Academic	18	13
Control	15	13
Total	100	89

Employment History During the Follow-up Period

LABOR MARKET ENTRY DURING THE FOLLOW-UP PERIOD

Employment rates for the various groups of subjects are assessed in terms of the percentages of each group who entered the labor market during each of the two years of the study and in terms of the average number of weeks that the subjects in each group held employment during each of the two years. Table 34 shows the percentages from each group who entered the labor market during each year. Data are presented separately for the two sexes.

TABLE 34. PERCENTAGES OF MALES AND FEMALES ENTERING THE LABOR MARKET, BY SUBJECT GROUP AND YEAR OF FOLLOW-UP

Subject groups and follow-up periods	Males		Females	
	Total N's	Percent entry	Total N's	Percent entry
First twelve months				
Academic-Vocational	19	95	42	50
Vocational	25	84	16	38
Academic	7	100	22	36
Control	10	40	35	23
Second twelve months				
Academic-Vocational	22	92	38	84
Vocational	24	100	17	88
Academic	5	100	21	86
Control	5	100	31	68

During the first follow-up year, marked differences appeared between sexes and also between the Control group and the three treatment groups. However, those differences diminished or disappeared in the second follow-up year. From the first year to the second year, females showed the most dramatic changes. In the first year, no female group had more than one-half of its members in the labor market, and the Control group had less than one-fourth of its members employed or actively seeking employment. During the second year all groups had over two-thirds of their members in the labor market at one time or another. The labor market entry figure for the Control group, although still the lowest, was three times as high as it had been during the preceding year.

With the exception of the Control group, the labor market entry figures for males were quite high. Due to the loss of one-half of the male Control group in the second year, interpretation of the apparent dramatic gain from 40 percent to 100 percent in labor market entry must be made with caution.

Where cells contained sufficient numbers of subjects to justify analyses, two-group chi square tests were computed for each sex and for each of the follow-up years to determine whether proportions entering the labor market differed between subject groups. The Fisher exact probability test was used where numbers were too small to permit the use of chi square tests. The results of these tests are summarized in Table 35. For the first follow-up year a significantly higher proportion of male subjects in each of the experimental groups than in the Control group entered the labor market. Among female groups, only the Academic-Vocational group exceeded the Control group on labor market

TABLE 35. RESULTS OF COMPARISONS OF PROPORTIONS ENTERING THE LABOR MARKET, BY SEX AND YEAR OF FOLLOW-UP

Follow-up period and subject groups compared	Probabilities associated with differences		
	Males[a]	Females[b]	Total[b]
First twelve months			
Academic-Vocational vs. control	< .01	< .05	< .001
Vocational vs. control	< .05	> .10	< .001
Academic vs. control	< .05	> .10	> .05
Experimental groups combined vs. control	< .01	> .10	< .001
Second twelve months			
Academic-Vocational vs. control	> .10	> .10	> .05
Vocational vs. control	> .10	> .10	< .05
Academic vs. control	> .10	> .10	> .10
Experimental groups combined vs. control	> .10	> .05	< .02

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[a] Because of small sample size, significance was determined by the Fisher exact probability test. N's are shown in Table 34.

[b] Probabilities determined by chi square techniques. N's are shown in Table 34.

entry during the first year. In the second year, there were no significant differences between male subject groups nor between the female groups. However, when results for the two sexes were combined a number of significant differences were apparent.

These analyses indicated that in the first year the Control group subjects were exceeded both by the Academic-Vocational and the Vocational group on labor market entry. In the second year, only the Vocational group exceeded the Control group. However, when responses from all subjects who had received training were compared with Control group responses, the trained groups exceeded the Control group on labor market entry both during the first and the second follow-up years.

TENURE IN EMPLOYMENT DURING THE FOLLOW-UP PERIOD

A second index of employment considered in the follow-up study was the average number of weeks of employment reported by members of each group of subjects during each of the two years covered by the study. The results of this phase of the investigation are shown in Table 36 for males and in Table 37 for females. Through analysis of covariance procedures, it was determined that both for males and for females significant differences exist among the subject groups for the first follow-up year but not for the second follow-up year. Using the Scheffe' procedure it was determined that in the first year, males and females in both of the treatment groups which involved vocational training were employed for more weeks than were males in the untreated control group. Subjects for whom data were available in the second year were employed for a much greater part of that year than was shown by corresponding groups of respondents in the first follow-up year. Because all of the groups, and especially the Academic and Control groups, showed marked improvement from the first year to the second year, the initially observed differences largely disappeared by the end of the second year.

TABLE 36. WEEKS OF EMPLOYMENT PER YEAR FOR ALL MALES

Subject groups and follow-up periods	N's	Unadjusted means (Wks.)	Adjusted means (Wks.)
First twelve months			
Academic-Vocational	19	26.0	26.1
Vocational	25	31.5	28.9
Academic	7	19.5	20.8
Control	10	8.7	10.0
Second twelve months			
Academic-Vocational	22	43.8	----
Vocational	24	48.5	----
Academic	5	42.5	----
Control	5	36.2	----

Covariance (first twelve months): df 3,56; $F = 5.01$; $p < .005$

Comparison of adjusted means (first twelve months): $F' = 6.57$. For any difference to be significant at the .10 level, F must be equal to or greater than F'. Significant two-group comparisons were:

Academic-Vocational with Control, $F = 8.83$
Vocational with Control, $F = 13.95$

Covariance (second twelve months): df 3,51; $F = .44$; $p > .10$

TABLE 37. WEEKS OF EMPLOYMENT PER YEAR FOR ALL FEMALES

Subject groups and follow-up periods	N's	Unadjusted means (Wks.)	Adjusted means (Wks.)
First twelve months			
Academic-Vocational	43	22.9	22.5
Vocational	16	23.0	23.1
Academic	24	17.8	18.1
Control	35	7.4	7.6
Second twelve months			
Academic-Vocational	39	23.4	----
Vocational	17	31.5	----
Academic	22	27.3	----
Control	31	13.2	----

Covariance (first twelve months): df 3,113; $F = 5.45$; $p < .005$

Comparison of adjusted means (first twelve months), $F' = 6.42$. Significant two-group comparisons were:

Academic-Vocational with Control, $F = 14.65$
Vocational with Control, $F = 9.03$

Covariance (second twelve months): df 3,104; $F = 2.64$; $p > .10$

Considering weeks of employment during the first and second follow-up years, patterns of difference among female groups were identical to those observed among male groups. Significant differences were apparent for the first year of follow-up, but not for the second.

Because there were slight differences in the number and identity of subjects from whom data were collected during the two follow-up years, a separate analysis was made which includes only the subjects who provided a complete and continuous set of data for both years. All subjects who met the above condition were included without regard to whether they were ever employed. Results of analyses of these data are shown in Table 38. Even though there is a wide variation in the means of the male subject groups (from 64.8 weeks for the Control group to 91.2 weeks for the Vocational group), the means do not differ significantly. However, results of the analysis of covariance for females indicates that there are significant differences among their group means. Further analyses with the Scheffe' procedure indicated that both the Academic-Vocational and Vocational groups were employed a significantly greater number of weeks than the Control group females.

TABLE 38. WEEKS OF EMPLOYMENT DURING TWENTY-FOUR MONTH PERIOD, MALES AND FEMALES

Subject group	All males		All females		
	N's	Unadjusted means (Wks.)	N's	Unadjusted means (Wks.)	Adjusted means (Wks.)
Academic-Vocational	18	88.1	38	46.0	43.6
Vocational	22	91.2	16	54.3	54.7
Academic	5	78.2	21	41.1	43.5
Control	5	64.8	29	20.5	21.7

Covariance, males: *df* 3,45; $F = 2.44$; $p > .10$

Covariance, females: *df* 3,99; $F = 3.92$; $p < .05$

Comparison of adjusted means (females), $F' = 6.39$. Significant two-group comparisons were:

Academic-Vocational with Control, $F = 6.72$
Vocational with Control, $F = 9.60$

Income From Employment During the Follow-up Period

Three types of data were used in determining whether there were differences among experimental groups in the amount of their earnings during the two-year follow-up period. The three types of data were: (a) the rate of hourly pay reported by persons who were employed as of the twelfth and twenty-fourth month; (b) the average annual income from employment for each group during the first and second follow-up years; and (c) the average biennial income from employment by those subjects who provided a complete two-year follow-up record.

AVERAGE RATES OF HOURLY PAY DURING THE FOLLOW-UP PERIOD

Table 39 shows the results of comparisons involving rates of hourly pay. In no case was there a significant difference among the subject groups of either sex or for either of the two years. As was anticipated, all groups reported higher average rates of hourly pay during the second year than during the first. However, contrary to expectations, males in the Control group showed the greatest improvement from the first to the second year.

AVERAGE ANNUAL EARNINGS DURING THE FOLLOW-UP PERIOD

Table 40 and 41 show comparisons involving the average annual earnings of subjects during the first and second years following the training period, although averages for males were higher than those for females (due both to a higher employment rate and a higher rate of hourly pay) patterns among groups and between years were very similar for the two sexes. During the first year earnings of the Control groups of both sexes were significantly exceeded by the earnings both of the Academic-Vocational subjects and the Vocational subjects.

During the second year, however, there were no significant differences in total earnings between any of the subject groups. Academic and Control subjects of both sexes made the most dramatic improvement in annual earnings from the first to the second year of the follow-up study, thus precluding a repetition of the pattern of significant differences found during the first year.

TABLE 39. HOURLY RATE OF PAY, MALES AND FEMALES

Subject groups and follow-up periods	Males		Females	
	N's	Unadjusted means	N's	Unadjusted means
As of 12th month				
Academic-Vocational	16	$1.72	22	$1.44
Vocational	21	1.64	7	1.23
Academic	6	1.96	9	1.25
Control	4	1.20	10	1.16
As of 24th month				
Academic-Vocational	16	1.86	17	1.60
Vocational	21	1.78	9	1.53
Academic	5	2.25	8	1.38
Control	4	1.94	9	1.26

Covariance, males (12th month): df 3,42; F = 1.25; p > .10

Covariance, females (12th month): df 3,43; F = .84; p > .10

Covariance, males (24th month): df 3,41; F = 2.49; p > .10

Covariance, females (24th month): df 3,38 ; F = .70; p > .10

TABLE 40. AVERAGE ANNUAL EARNINGS OF MALES

Subject groups and follow-up periods	N's	Unadjusted means	Adjusted means
First twelve months			
Academic-Vocational	19	$2377	$2365
Vocational	25	2551	2558
Academic	7	2222	2135
Control	10	762	828
Second twelve months			
Academic-Vocational	22	3180	----
Vocational	24	3470	----
Academic	5	4069	----
Control	5	2675	----

Covariance (first twelve months): df 3,56; $F = 3.63$; $p < .025$

Comparison of adjusted means (first twelve months), $F' = 6.57$. Significant two-group comparisons were:

Academic-Vocational with Control, $F = 7.72$
Vocational with Control, $F = 10.67$

Covariance (second twelve months): df 3,51; $F = .86$; $p > .10$

TABLE 41. AVERAGE ANNUAL EARNINGS OF FEMALES

Subject groups and follow-up periods	N's	Unadjusted means	Adjusted means
First twelve months			
Academic-Vocational	43	$1250	$1185
Vocational	16	1077	1094
Academic	24	771	829
Control	35	316	348
Second twelve months			
Academic-Vocational	39	1478	----
Vocational	17	1638	----
Academic	22	1431	----
Control	31	762	----

Covariance (first twelve months): df 3,113; $F = 5.24$; $p < .005$

Comparison of adjusted means (*first twelve months*), $F' = 6.42$. Significant two group comparisons were:

Academic-Vocational with Control, $F = 15.58$
Vocational with Control, $F = 7.04$

Covariance (second twelve months): df 3,104; $F = 2.20$; .10 $p > .05$

AVERAGE BIENNIAL EARNINGS DURING THE FOLLOW-UP PERIOD

In order to eliminate effects due to different subjects providing data the first and second years, analysis was made of only that data which was provided by subjects who were represented in both years. The results of these analyses are shown in Table 42. The patterns of difference indicated in Table 42 for average biennial earnings are identical to those in Table 38 for weeks of employment during the twenty-four month follow-up period. There was no significant difference among male subject groups; but for females both the Academic-Vocational group and the Vocational group earned significantly more on the average during the two year period than did the Control group.

TABLE 42. AVERAGE BIENNIAL EARNINGS, MALES AND FEMALES

Subject group	Males		Females		
	N's	Unadjusted means	N's	Unadjusted means	Adjusted means
Academic-Vocational	18	$5896	38	2731	2741
Vocational	22	6344	16	2668	2666
Academic	5	7345	21	1806	1796
Control	5	4914	29	1098	1093

Covariance, males: df 3,45; $F = 1.51$; $p > .10$

Covariance, females: df 3,99; $F = 4.05$; $p < .01$

Comparison of adjusted means, $F' = 6.39$. Significant two-group comparisons were:

Academic-Vocational with Control, $F = 11.13$
Vocational with Control, $F = 6.40$

Job Satisfaction

All subjects found to be employed as of the twelfth and/or the twenty-fourth month of the follow-up period were asked to complete the Brayfield-Rothe Job Satisfaction Questionnaire in relation to the position they held at that time. Results of the analyses of job satisfaction data are summarized in Table 43 for males and for females separately. No statistically significant difference was found among subject groups of either sex for either the first or the second follow-up year. There is a considerable amount of variation among the mean satisfaction scores reported for the different subject groups, but the within-group variation was sufficient to preclude the finding of statistical significance in the comparisons among groups.

TABLE 43. JOB SATISFACTION, MALES AND FEMALES

Subject groups and follow-up periods	Males		Females	
	N's	Unadjusted means	N's	Unadjusted means
As of 12th month				
Academic-Vocational	16	61.2	21	64.5
Vocational	20	61.1	8	66.9
Academic	6	52.2	12	51.5
Control	5	52.0	8	59.1
As of 24th month				
Academic-Vocational	15	58.8	17	70.6
Vocational	18	55.2	9	67.1
Academic	4	56.4	7	59.1
Control	4	57.0	7	48.7

Covariance, males (12th month): df 3,42; F = .81; p > .10

Covariance, females (24th month): df 3,44; F = 1.08; p > .10

Covariance, males (12th month): df 3,36; F = 1.63; p > .10

Covariance, females (24th month): df 3,35; F = 1.13; p > .10

Employer Ratings

An effort was made to locate and interview the immediate supervisors of all of the subjects who had indicated that they were working as of the twelfth month of the follow-up period. The supervisors were asked to complete the Goertzel Job Success Rating Scale for the subjects who worked under their direction. Where personal interviews were not feasible, forms were mailed. Due to a lack of time between the twenty-fourth month of the follow-up period and the termination of the study, employers were not contacted the second year.

Results of the analyses of employer ratings are shown in Table 44 for males and females separately. As with job satisfaction, sizable differences appear between means. However, due to the high degree of variation within groups, no statistically significant difference was indicated among subject groups.

TABLE 44. EMPLOYER RATINGS, MALES AND FEMALES

Subject groups and follow-up periods	Males		Females	
	N's	Unadjusted means	N's	Unadjusted means
As of 12th month				
Academic-Vocational	15	37.0	21	39.2
Vocational	18	31.0	7	44.0
Academic	6	37.7	8	37.6
Control	5	27.6	9	30.8

Covariance, males: df 3,39; F = 1.32; $p > .10$

Covariance, females: df 3,40; F = 2.24; $p > .10$

Continuation of Education

A tangential question which was considered in the follow-up study was that of whether the various treatments would influence the extent to which subjects would undertake additional education or training. For this set of analyses males and females were combined into one group. Subjects were credited with continuation of education or training if they participated in any formal course one week or more in duration. This included all types of learning experiences from employer directed in-service training to enrollment for college credit. Even with this broad definition, relatively few subjects indicated that they were continuing to upgrade through formal learning situations. Table 45 shows the percentages of subjects in each group who participated in some form of training during the first and second follow-up years. No significant difference was found among the groups for either year, with no group having over fifteen percent continuation.

General Satisfaction With Life

In the follow-up questionnaire, an attempt was made to assess the degree of satisfaction each subject felt in relation to the life they were experiencing. In doing this, subjects were asked to indicate which of the following best described how they felt:

I really like it
My likes just balance my dislikes
I dislike it but I'll have to put up with it
I hate it.

For purposes of analysis, responses on the first two alternatives were combined and given the designation "satisfied". Subjects choosing

TABLE 45. CONTINUATION OF EDUCATION, MALES AND FEMALES COMBINED

Subject groups and follow-up periods	Total N's	Percent who continued
First twelve months		
Academic-Vocational	60	12
Vocational	41	15
Academic	28	14
Control	43	14
Second twelve months		
Academic-Vocational	59	12
Vocational	41	12
Academic	27	14
Control	33	6

either of the last two alternatives were considered to be "dissatisfied". Table 46 shows the percentages of subjects in each group who were classified as "satisfied" as of the twelfth and twenty-fourth month of the follow-up. Chi square analyses were computed to determine whether significant differences in proportions of satisfied subjects were present in each of the possible two-group comparisons. No such significant differences were found for either of the two follow-up years. However, when responses from the three experimental groups were combined and then compared with responses from the control group, a significant difference was observed for the second follow-up year. The same test carried out for the first follow-up year showed no significant difference.

Data considered in this section suggest a possible positive relationship between training and satisfaction with life which may increase over time. However, no distinctions can be made regarding a type of training which may be especially advantageous.

TABLE 46. GENERAL SATISFACTION WITH LIFE, MALES AND FEMALES COMBINED

Subject group and follow-up period	Total N's	Percent satisfied
As of 12th month		
Academic-Vocational	58	83
Vocational	41	83
Academic	28	79
Control	41	73
As of 24th month		
Academic-Vocational	56	89
Vocational	36	92
Academic	25	84
Control	32	72

Summary of Differences Observed During the Follow-up Period

A variety of approaches were utilized in the follow-up phase of this study in an effort to obtain a meaningful evaluation of the experimental treatments which had been applied earlier. The principal findings of the follow-up investigation are summarized below.

(a) In no case was a statistically significant difference found between groups that had received experimental treatment--the Academic-Vocational, the Vocational, and the Academic groups. However, there was a consistent tendency for the Academic group to be exceeded by the two other groups in labor market entry, tenure in employment, and total earnings during the first year following completion of training. On the other hand, throughout the two years covered by the follow-up study there was a tendency for the Academic group to have the highest hourly rate of pay of any of the groups.

(b) In a number of analyses, the Control group was exceeded to a statistically significant extent by the groups of subjects who had completed experimental training programs.

(c) During the first year of the follow-up period, males in the three treatment groups exceeded the Control group males in proportions entering the labor market. During the same time period, females in the Academic-Vocational group significantly exceeded Control group females in proportions entering the labor market.

(d) Males and females in the Academic-Vocational and Vocational groups exceeded their Control group counterparts in average number of weeks of employment and in average earnings for the first year of the follow-up study.

(e) When results for males and for females were analyzed separately, no statistically significant differences were found for the second year of the follow-up study. With subjects of both sexes pooled, the Vocational group exceeded the Control group in labor market entry; and, with all experimentally treated groups pooled, the Control group again was exceeded on the same variable.

(f) In terms of average number of weeks of employment and average earnings over the entire two-year follow-up period, Academic-Vocational and Vocational group females significantly exceeded their Control group counterparts. No significant differences were found for male groups in this set of analyses.

(g) No significant differences were found among the subject groups in job satisfaction scores, employer ratings, proportions continuing in education or training, or in the extent of their general satisfaction with life.

CHAPTER V

GENERAL OVERVIEW AND CONCLUSIONS

Program Summary

The study described in this report was designed as an experimental assessment of a multi-faceted training program for recent school dropouts. This training program, established in a large urban high school, provided a set of differentiated educational experiences for selected program participants.

Program participants were school dropouts between the ages of seventeen and twenty-two who were unemployed or underemployed and who had been out of school for at least one year. Subjects were selected for the program by personnel from the Oklahoma Employment Security Commission on the basis of interests and aptitudes. In total, 292 participants were selected to begin training and 46 were identified as members of a control group to receive no training. As the training program progressed, another variety of control group--composed of those who started training and dropped out before fifteen percent of the training time had elapsed--emerged and was maintained for comparative purposes on selected criterion variables.

The educational program provided for subjects of the study was broken into three distinct types. One treatment consisted of vocational instruction in combination with academic course work. Students assigned to this group (designated as the Academic-Vocational group) received instruction in one of the following vocational areas: General Office Clerk, Refresher; Machine Tool Operator; Stenographer, Refresher; Welder, Combination; Office Machine Mechanic; Sheet Metal Worker; Cosmetology; or Auto Mechanic. They also received separate instruction in a number of academic areas (including social science, English, science, and mathematics). A second variety of treatment was provided for members of the Vocational group. This treatment consisted only of vocational training. The vocational training was the same as that offered for the Academic-Vocational group. A third treatment (for persons designated as members of the Academic group) provided instruction only in the academic areas.

Students were assigned to various experimental treatment groups on the basis of a combination of factors, including interest, test scores, and number of openings. Members of the no-training control group (designated as Control group I) were selected according to the same set of criteria. Students who received the combination program were in their particular vocational class with those who received only vocational training. Similarly, students who received the combination program were in their academic classes with those receiving only academic training. The total length of the training program ranged from 20 to 48 weeks. Students in the various groups attended school daily, some three hours per day (Academic group), some five (Vocational group), and some eight (Academic-Vocational group).

A variety of data collection instruments were administered to the subjects of the study. Several were given on a pretest and posttest basis in order to ascertain the degree to which certain variables changed in value over the period of time allocated for formal training. Because the vocational training programs varied in length, posttests were administered at two separate times. Subjects posttested at Time I were those in classes which ranged in length from twenty to thirty-six weeks. Those tested at Time II were in classes that ranged in duration up to forty-eight weeks. Since all of the subjects receiving only academic instruction were scheduled to remain in the program for a total of forty-three weeks and since members of this group were needed for purposes of comparison with subjects from the other experimental groups (including those tested both at Time I and Time II), proportionate numbers were posttested at Time I and at Time II. Similarly, proportionate numbers of those in the control group receiving no training (designated as Control group I) and those who did not persist in the program (designated as Control group II) were posttested at Time I and at Time II.

Major objectives of the total program of training and evaluation relate to differences observed within and among subject groups at the end of the training period and during a two-year period of intensive follow-up. The assessment of these differences was accomplished with a variety of statistical tools, including analysis of covariance, chi square, Mann-Whitney U, t tests, and the Fisher exact probability test.

The major findings of the study are summarized below in conjunction with the primary research questions which were structured for the study.

Summary of Findings

DIFFERENCES IN ACADEMIC ACHIEVEMENT

The major research question relating to academic achievement was:

> To what extent will former dropouts who received both academic and vocational training, only vocational training, only academic training, and no additional training, differ in terms of academic achievement levels.

In relation to the above question, it was found that after a relatively short period of approximately five months, subjects who received only academic training achieved significantly higher scores on standardized tests in science and in social studies than did subjects who received only vocational training. They also scored significantly higher on science achievement tests than did subjects who received no training at all. Over a longer period of training--approximately 9 months--there were no significant differences among the subject groups on any of the academic achievement measures utilized in this study. In neither of the time periods was there a significant difference between the academic achievement of groups of subjects who received vocational training in conjunction with academic training and that of subjects who received only academic training. Thus, the assumption that the learning of academic subject matter is enhanced if accompanied by the learning of a vocational skill was not supported by data obtained in this phase of the investigation. Also, significant differences in academic achievement were found only in three of a total of ten comparisons between subjects who received academic training (either alone or in combination with vocational training) and subjects who did not receive academic training.

CHANGES IN SOCIAL-PSYCHOLOGICAL CHARACTERISTICS

The major research question involving social-psychological characteristics was:

> To what extent will the various treated and untreated groups differ at the conclusion of the training period in terms of specified social-psychological characteristics.

In examining the data of this study it was found that at the end of training, subject groups differed on social-psychological characteristics in only two cases, both involving measurements from the *California Test of Personality*. After approximately five months of training, the social adjustment test scores of students who received only vocational training were exceeded significantly by those of a control group who had entered training but had withdrawn before completing as much as fifteen percent of their course. After a period of approximately nine months, the personal adjustment scores of subjects who received only vocational training were exceeded significantly by those of students who received only academic training. The assumption that returning to a school situation for academic and/or vocational training would have a significant enhancing effect on the measured social-psychological characteristics of former school dropouts was not generally supported by the findings of this study.

DIFFERENCES IN ACHIEVEMENT IN VOCATIONAL TRAINING

The major research question on vocational achievement was:

> To what extent will the individuals who receive both academic and vocational training and those who receive only vocational training differ in terms of vocational achievement?

When measured in terms of performance ratings given by course instructors, there was no significant difference in achievement in vocational training between groups who received only vocational training and those who received academic training in conjunction with their vocational training. However, on the basis of objective paper-and-pencil examinations over vocational course content, males who received academic as well as vocational training significantly exceeded those who received only vocational training. Females receiving the differing types of training did not differ significantly in terms of vocational achievement scores.

DIFFERENCES IN ACHIEVEMENT DURING A TWO-YEAR FOLLOW-UP PERIOD

The general research question regarding job history and job success following the training period was:

> To what extent will the members of the various groups differ in terms of job placement history and job success over a two-year follow-up period?

A variety of measures were utilized in comparing the job histories and the job success of the individuals who constituted the various subject groups in this investigation. In no case was a significant difference found between groups that had received experimental treatment--the Academic-Vocational, Vocational, and Academic groups. However, especially during the first year of the two-year follow-up period, there was a consistent tendency for subjects who had received vocational training either alone or in combination with academic training to exceed the Academic group in labor market entry, tenure in employment, and total earnings. There was a tendency in the opposite direction, also, (not of statistically significant proportions) for males who received only academic training to be receiving the highest hourly rate of pay.

In comparing data from the three groups that had received training with data from Control group subjects who had received little or no training, a number of statistically significant differences were found. Groups that had received training, especially the Academic-Vocational and the Vocational groups, exceeded the Control group in proportions entering the labor market, in average number of weeks of employment, and in average annual earnings. On each of these three variables, however, there were fewer significant differences during the second year of the follow-up than during the first.

On the basis of the measures used to assess job satisfaction, employer ratings, and general satisfaction with life, no significant differences were found among the subject groups in this study. Similarly, there was no significant difference in the proportions of subjects in the various groups who continued their education or training during the two-year follow-up period.

Efforts were made to identify characteristics of the subjects which were related to the extent of their achievement during or following the training period. It was not possible in this investigation to identify either individual variables or clusters of variables which were related in any consistent way to achievement.

Limitations

Certain problems and limitations of this study should be considered in drawing conclusions regarding the methodology and findings which have been described.

Because this field study was in many respects exploratory in nature, data were assembled for a wide range of background variables in an effort to identify a limited set which would be closely related to the dependent variables under consideration. One use made of these data was to attempt to make adjustments statistically for initial differences in groups which could not be controlled as effectively as was desired through random assignment of subjects. Two examples of the use of this approach are reported in Chapter III. Although these efforts appeared to be at least partially effective, the difficulty of obtaining valid and reliable measurements of social-psychological characteristics should be noted. Also the cumbersomeness of dealing statistically with a vast array of potentially useful variables should not be underestimated when contemplating the use of the above procedures.

The duration of training programs utilized in this investigation may have imposed a limitation on the study in being too short to effect measurable changes on many of the variables being considered. The follow-up period also was not of sufficient length to provide for an adequate appraisal of long term effects of various treatments.

The persistently recurring problem of attrition also was experienced in this investigation. In addition to premature withdrawal from training, a number of Control group subjects were lost through recruitment for other civilian youth programs. During the two-year follow-up period a number of subjects both in experimental and in control groups were dropped from the study because of entry into the military services. A major Urban Renewal project necessitated the relocation of many of the participants in this study, along with their relatives and friends who had been used as contacts by follow-up interviewers. As a consequence of the various forms of attrition, some subject groups were depleted to a point where meaningful interpretation of results is difficult.

Conclusions

The varying pattern of results observed when different criterion measures of "program success" were used demonstrates that the phenomena under study are exceptionally complex and that there is no singular mode of assessment which will be representative. Generally, the results of the program, as measured at the end of training, were somewhat disappointing in view of the expectation that the group receiving both academic and vocational training would excel. As of that point in the investigation, there also was a disappointing lack of difference between subjects who had received training and those who had not.

During the first year covered by the follow-up period, a number of differences appeared which generally favored the two experimental groups that had received vocational training, either alone or in combination with academic training. By the end of the second year of the follow-up period, however, Control group subjects and subjects who had received only academic training appeared to be approaching the levels of occupational success being experienced by their counterparts who had received vocational training.

These findings suggest a tentative conclusion that vocational training prepared participants in this study to find employment more readily and to hold such employment on a more nearly continuous basis during the first year after the training was completed. It appears that subjects who received both academic and vocational training tended to utilize the latter by entering directly into related employment. On the other hand, many of the subjects who received only academic training did not become employed as quickly, but eventually found white collar jobs at a slightly higher hourly rate of pay.

A number of questions remain which can be answered only through an extension of the follow-up period. Foremost, perhaps, is the question of whether subjects who received both academic and vocational training will continue in the same occupational patterns as those who received only vocational training or will be able to advance more rapidly because of having received some additional general education.

An underlying objective of this project was to provide a public demonstration of how local, state, and Federal agencies might cooperate effectively in seeking tenable solutions to a pressing social problem. In many ways, this has been accomplished. However, this kind of cooperation is relatively new on the operational scene and is quite difficult to initiate. Different agencies have different rules, policies, and regulations. More often than not, these tend to be disparate and conflicting. And, whereas, on the basis of individual negotiation, compromise and agreement is possible (as in the current project), a dire need exists for a top-level coordinating mechanism designed to facilitate the operation of jointly sponsored projects of the kind herein reported. Such a mechanism could assist immeasurably in reconciling the oft-divergent requirements of social policy and experimental design.

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APPENDIX A

RESEARCH PARADIGM: ETIOLOGY AND REHABILITATION OF THE DROPOUT

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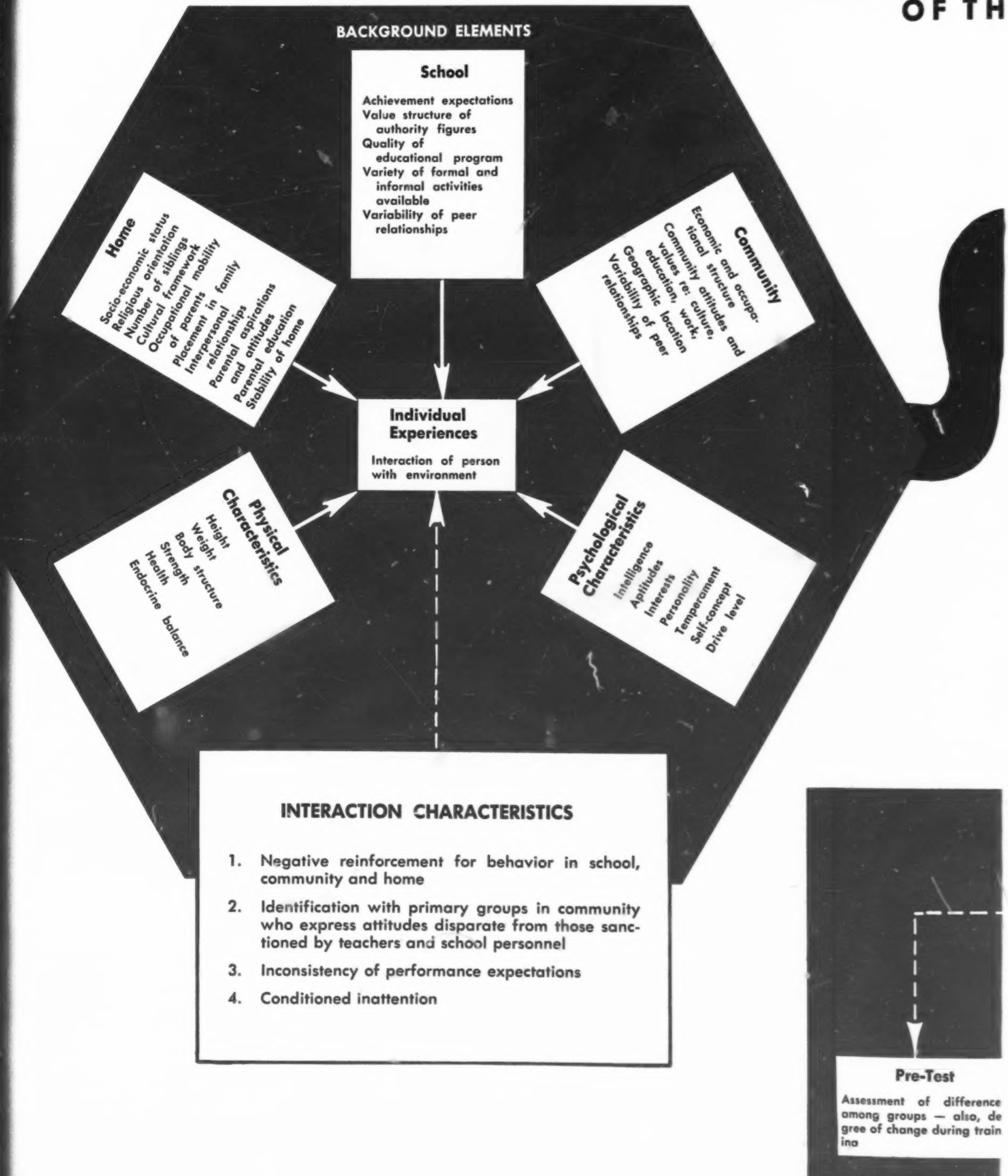


BACKGROUND ELEMENTS

School

Achievement expectations
Value structure of authority figures
Quality of educational program
Variety of formal and informal activities available
Variability of peer relationships

Home

Socio-economic status
Religious orientation
Number of siblings
Cultural framework
Occupational mobility of parents
Placement in family
Interpersonal relationships
Parental aspirations and attitudes
Parental education
Stability of home

Community

Economic and occupational structure
Community attitudes and values re: culture, education, work,
Geographic location
Variability of peer relationships

Individual Experiences

Interaction of person with environment

Physical Characteristics

Height
Weight
Body structure
Strength
Health
Endocrine balance

Psychological Characteristics

Intelligence
Aptitudes
Interests
Personality
Temperament
Self-concept
Drive level

INTERACTION CHARACTERISTICS

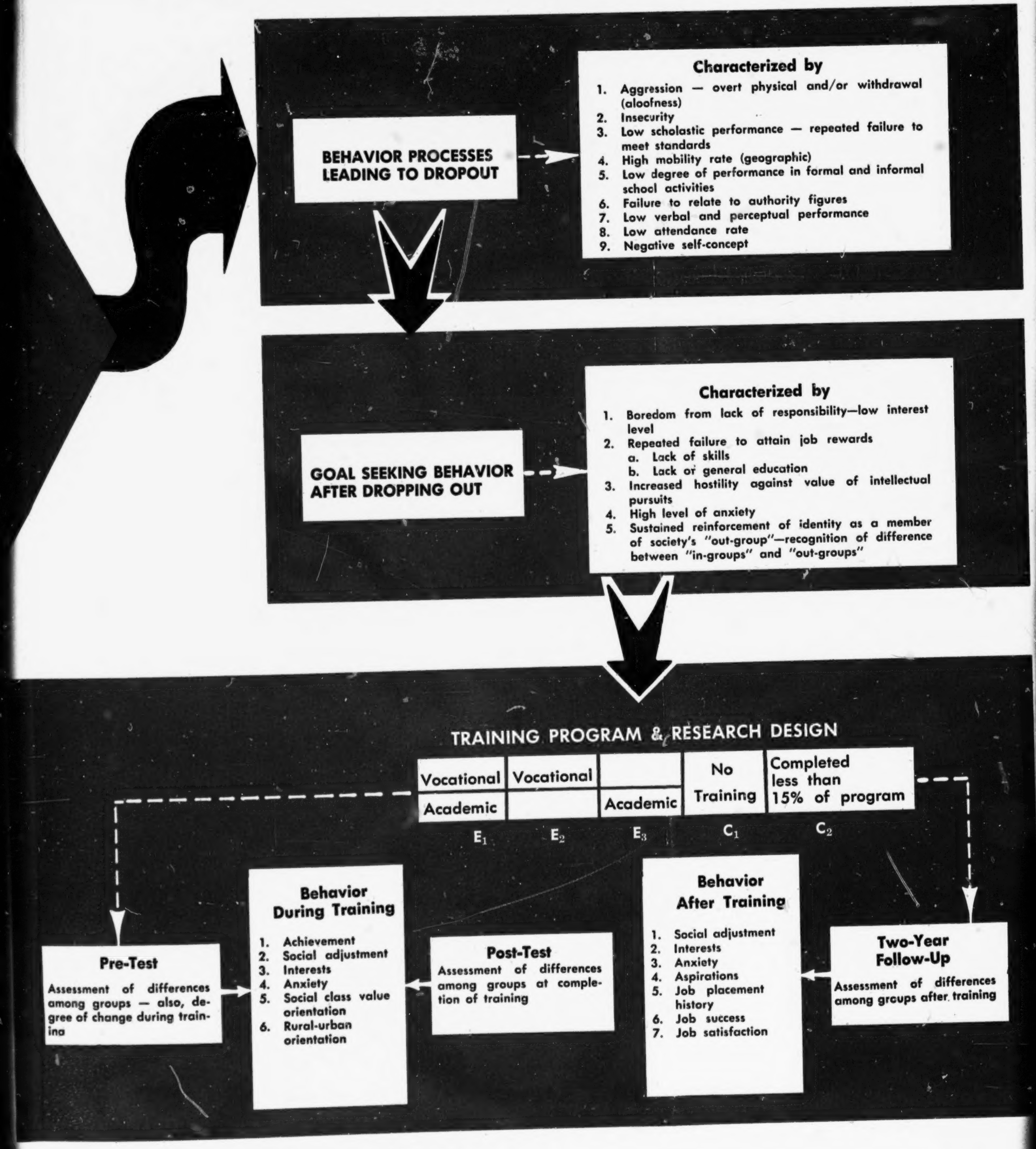
1. Negative reinforcement for behavior in school, community and home
2. Identification with primary groups in community who express attitudes disparate from those sanctioned by teachers and school personnel
3. Inconsistency of performance expectations
4. Conditioned inattention

Pre-Test

Assessment of difference among groups — also, de gree of change during train ing

OUTH OPPORTUNITY PROJECT / Oklahoma State University / Stillwater

ETIOLOGY AND REHABILITATION OF THE DROPOUT



BEHAVIOR PROCESSES LEADING TO DROPOUT

Characterized by

1. Aggression — overt physical and/or withdrawal (aloofness)
2. Insecurity
3. Low scholastic performance — repeated failure to meet standards
4. High mobility rate (geographic)
5. Low degree of performance in formal and informal school activities
6. Failure to relate to authority figures
7. Low verbal and perceptual performance
8. Low attendance rate
9. Negative self-concept

GOAL SEEKING BEHAVIOR AFTER DROPPING OUT

Characterized by

1. Boredom from lack of responsibility—low interest level
2. Repeated failure to attain job rewards
   a. Lack of skills
   b. Lack of general education
3. Increased hostility against value of intellectual pursuits
4. High level of anxiety
5. Sustained reinforcement of identity as a member of society's "out-group"—recognition of difference between "in-groups" and "out-groups"

TRAINING PROGRAM & RESEARCH DESIGN

E_1	E_2	E_3	C_1	C_2
Vocational	Vocational		No Training	Completed less than 15% of program
Academic		Academic		

Pre-Test

Assessment of differences among groups — also, degree of change during training

Behavior During Training

1. Achievement
2. Social adjustment
3. Interests
4. Anxiety
5. Social class value orientation
6. Rural-urban orientation

Post-Test

Assessment of differences among groups at completion of training

Behavior After Training

1. Social adjustment
2. Interests
3. Anxiety
4. Aspirations
5. Job placement history
6. Job success
7. Job satisfaction

Two-Year Follow-Up

Assessment of differences among groups after training

APPENDIX B

THE EDUCATIONAL PROGRAM

THE EDUCATIONAL PROGRAM

A complete report of the educational program is provided in a separate publication (16). This Appendix presents a summary of the educational program and describes briefly some of the training related activities that took place.

Educational Program

The following presentation is by subject area. A brief overview is given of the main topics of study and the sources of instructional materials.

AUTOMOBILE MECHANICS

Students in this skill course were encouraged to specialize in the aspects of automobile repair and maintenance for which they showed an aptitude and in which they were interested. Instruction was further adapted to individual differences of students by having slower ones learn a few skills well and by having faster ones master more skills. Some students who became proficient in particular skills assisted in the training of others in their specialities.

The topics studied included braking systems, ignition systems, fuel systems, engines, and transmission systems. Instruction consisted of lectures on certain topics, supplemented by films on the particular topics, demonstrations, and practice in disassembly, assembly, and troubleshooting by students. There was heavy emphasis on visual aids and demonstrations since some could not read well enough to use equipment manuals. Also the class took field trips to a manufacturer's automobile assembly plant and to a company that rebuilds parts. Each Friday students worked on their own automobiles.

Other materials for instruction included charts of certain equipment, models of certain equipment, manufacturers' pamphlets, various types of equipment for automobile maintenance and testing, and actual parts of automobiles such as generators, starters, carburetors, engines, and transmissions. The principal textbooks used were:

Blanchard, Harold Frederick and Ritchen, Ralph. Auto Engines and Electrical Systems. 3rd ed. New York, Moton, 1963. 602 pp.

Crouse, William H. Automotive Mechanics. 3rd ed. New York: McGraw-Hill, 1956. 726 pp.

Crouse, William H. Automotive Transmissions and Power Trains. 2nd ed. New York: McGraw-Hill Book Co., Inc., 1955. 632 pp.

Heitner, Joseph. Automotive Mechanics, Principles and Practices. New York: D. Van Nostrand Co., Inc., 1953. 501 pp.

PRODUCTION SHEET METAL

In sheet metal one might train to be a sheet metal mechanic, draftsman, coppersmith, welder, aviation metalsmith, or general sheet metal contractor in such major industrial fields as heating and air conditioning, roofing, and household appliances. Since this was the initial training experience for students in this class, various individuals, dependent upon their differing talents were guided toward becoming sheet metal helpers, tool crib men, or production sheet metal workers.

The major content included in this course was organized around the topics of safety and maintenance, drawing, job planning, pattern marking, layout and pattern development, fabrication, manufacturing, and installation work.

Class instruction centered on many activities for the students. They learned how to use and maintain the shop equipment. They learned how to use orthographic projections to explain working drawings. They practiced pattern marking, and they followed layout methods. From field trips and housing developments they observed gutter and duct work. In the school shop students manufactured projects for their own use and for Goodwill Industries.

Textbooks used in the course included:

Bruce, Leroy F. Sheet Metal Shop Practice. 2nd ed., rev. Chicago: American Technical Society, 1964. 265 pp.

Kaberlein, Joseph J. Air Conditioning Layout. Milwaukee: The Bruce Publishing Company, 1954. 308 pp.

Kaberlein, Joseph J. Short Cuts for Round Layouts. Milwaukee: Bruce Publishing Company, 1947. 288pp.

Kaberlein, Joseph J. Triangulation Short-Cut Layouts. Milwaukee: Bruce Publishing Company, 1948. 290 pp.

Paull, James H. Industrial Sheet Metal Drawings. New York: D. Van Nostrand Company, Inc., 1938. 153 pp.

Spencer, Henry. Basic Technical Drawing. New York: Macmillan, 1965. 370 pp.

Measurement and Layout. Delmar Publishing Company. 89 pp.

Along with the textual materials, other aids to instruction included movies, wall charts, plates to illustrate drawings, shop drawings, and the sheet metal supplies for projects.

OFFICE MACHINE SERVICEMAN

The term "developmental" best describes the work in connection with the establishment of this class and its program. Equipment had to be obtained which was not immediately available, and thus, the class lost some time when the learning environment was not at its optimum. The machines themselves and their service manuals constituted the central part of the program as it developed. Training took place on manual typewriters, electric typewriters, adding machines, and spirit duplicators.

Instruction centered upon practice in disassembly and assembly of these machines and in cleaning and repairing them. Instructional aids in addition to the service manuals included slides for projection as supplied by manufacturers, the overhead projector, two different cleaning systems to represent commercial cleaning and mass production cleaning, and various kinds of shop tools needed in this work.

COMBINATION WELDER

This course provided training in arc welding, oxygen acetylene welding and burning, tungsten inert gas welding, and semi-automatic inert gas welding. Each step was accompanied by student practice until the procedure was mastered. Thus there was close supervision and one-to-one instruction by the instructor.

Classroom activity consisted of lectures, demonstrations, and practice by the students. Supporting activities included simple drawing, scale reading, and the specific performance of many different types of welds and related procedures. Classroom practice was reenforced by field trips to Tinker Air Force Base; Roberson Steel Company; Black, Sivalls, and Bryson, Inc.; and Arco Fabrics.

Instructional resources included various welding machines, equipment, and welding supplies, manufacturer's charts and pocket manuals, and the following books:

Bennett, A. E. and Siy, Louis J. Blue Print Reading for Welding. Albany, New York: Delmar Publishers, Inc., 1960. 145 pp.

Sacks, Raymond J. Theory and Practice of Arc Welding. 2nd ed. Princeton, New Jersey: Van Nostrand, 1960. 478 pp.

Stieri, Emanuele. Basic Welding Principles. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1953. 220 pp.

STENOGRAPHER, REFRESHER

The stenographic refresher course was designed to provide studies for qualifying trainees to hold or obtain jobs at various levels in the stenographic-secretarial field. This curriculum included the development of trainee skills in shorthand, typing, English, transcription, and operation of simple office machines. Spelling and grammar were correlated in all the work. The students needed to develop the ability to read and follow directions, to proofread accurately and speedily, to make corrections neatly, to utilize their time to work effectively under pressure, and to work for sustained periods of time. Finally, they were instructed in telephone courtesy, business psychology, and grooming and dressing for the office.

For example, English usage was a factor in typing, transcription, and dictation as well as in classwork in Business English. Greater individualization of instruction was achieved by having the students help each other in the initial learning of certain skills.

Students had dictionaries, workbooks, wall charts, and a variety of practice materials for instruction. In addition, the following printed materials were used:

Agnew, Peter L. *Office Machines Course*. (Packet material.)

Agnew, Peter Lawrence and Meehan, James R. *Secretarial Office Practice*. 6th ed. Cincinnati: Southwestern Publishing Company, 1960. 618 pp.

Gregg, John Robert; Leslie, Louis A. and Zoubek, Charles E. *Gregg Shorthand Manual Simplified*. 2nd ed. New York: Gregg Publishing Division, McGraw-Hill, 1955. 320 pp.

Hager, Hubert A.; Steward, Marie M., and Hutchinson, E. Lillian. *Business English*. 3rd ed. New York: McGraw-Hill Book Co., Inc., 1953. 402 pp.

Laird, Donald A. and Laird, Eleanor. *Practical Business Psychology*. 3rd ed. New York: Gregg Publishing Division, McGraw-Hill Book Co., Inc., 1961. 442 pp.

Leslie, Louis A.; Zoubek, Charles E.; and Hosler, Russell J. *Gregg Shorthand Simplified*. New York: McGraw-Hill, Inc., 1958. Vol. 1, 384 pp. and Vol. 2, 511 pp.

Leslie, Louis A. and Zoubek, Charles E. *Gregg Transcription Simplified*. 2nd ed. New York: Gregg Publishing Division, McGraw-Hill, 1956. 511 pp.

Lessenberry, David Daniel; Crawford, T. James; and Erickson, Lawrence W. *20th Century Typewriting*. 7th ed. Cincinnati: Southwestern Publishing Company, 1957. 170 pp.

GENERAL OFFICE CLERK, REFRESHER

The General Office Clerk Course was designed to train students for employment in the clerical or record-keeping field. The skills taught included typewriting, operating various business machines, bookkeeping, and filing. Associated with these skills was remedial or review work in English, spelling, vocabulary, and arithmetic. Also emphasis on social adjustment and business relations was made an integral part of all learning experiences.

In subjects such as typewriting and business arithmetic, students were pretested for the purpose of establishing a starting point for instruction. In business machines students obtained experience with adding machines, calculators, posting machines, and duplicating machines. On machines and in most subjects instruction took place individually or in small groups. When feasible students assisted in teaching other students. At the end the students were tested by the State Merit Board and the State Employment Service.

Many different kinds of learning aids were used in this class. There were practice sets for bookkeeping. There was filing paraphernalia for learning filing skills. Word lists of the American

Management Society were used to review spelling. Also, current withholding tax tables and FICA tax tables were used for practice in making up payrolls.

Some of the books and materials that were used in the stenographer refresher course were used in this class. Included were the resources for typing, office practice, and psychology. In addition the following books were used:

Carlson, Paul A.; Forkner, Hamden L.; and Boyhton, Lewis D. 20th Century Bookkeeping and Accounting. 21st ed. Southwestern Publishing Company: Cincinnati, Ohio, 1957. 532 pp.

Rosenberg, Reuben Robert and Lewis, Harry. Essentials of Business Mathematics. 5th ed. New York: Gregg Division, McGraw-Hill, 1958. 370 pp.

Sferra, Adam; Wright, Mary Elizabeth; and Rice, Louis A. Personality and Human Relations. 2nd ed. New York: McGraw-Hill Book Co., Inc., 1961. 217 pp.

Tressler, Jacob C. and Christ, Henry J. Grammar in Action. 4th ed. Boston: D. C. Heath and Co., 1962. 391 pp.

COSMETOLOGY

This course followed closely the requirements of the Oklahoma State Board of Cosmetology of 1000 hours in studies and practice. The practice was provided under conditions that similated closely those in a regular beauty salon. Aspects of the instruction included information and theory of beauty culture, the various procedures, some attention to shop management, and counseling on personal attributes. One class was provided for Negro students and one class was provided for white students because some procedures differ.

Various kinds of electrical apparatus was provided in the two classrooms as well as magazines, wall charts, film strips and other equipment.

Basic references used in the cosmetology classes included:

American Hairdresser Magazine

National Beauty School Journal

Colletti, Anthony. The Art of Modern Hair Styling. New York: Milady Publishers.

Standard Textbook of Cosmetology. New York: Milady Publishers. 494 pp.

Murray, Ann. Theory of Cosmetology. New York: Milady Publishers.

Van Dean Manual. New York: Milady Publishers.

Wall, Florence E. Principles and Practices of Beauty Culture. New York: Milady Publishers.

MACHINE TOOL OPERATOR

Training in this skill included bench work and machine shop practice necessary for workers in this area. Major machines on which students were trained were the lathe, shaper, milling machine, and drill press. Along with these machines were the various other tools and measuring devices necessary for machine tool work. Teaching consisted of readings, demonstrations, film viewings and discussions with student practice in the various processes.

Two main reading resources were available for this course:

Porter, Harold W.; Lawshe, Charles H. and Lascoe, Orville D. Machine Shop Operations and Setup. 2nd ed. Chicago: American Technical Society, 1965. 449 pp.

Wagner, Albert M. and Arthur, Harlan R. Machine Shop Theory and Practice. 2nd ed. Princeton, New Jersey: D. Van Nostrand Co., Inc., 1950. 306 pp.

Drafting was taught on a supplemental basis to students in certain skill areas and was not set up as an area in which students specialized. Practice and instruction was provided in freehand sketching, lettering, and blueprint reading. This experience appeared to be helpful to the program and probably could be intensified in future programs.

SOCIAL STUDIES

Most students came to social studies classes with a dislike for history, for teachers, for school, and for other symbols of established authority. Recognizing this, the instructor considered it his first responsibility to develop ways to change attitudes of students and motivate them to learn. In this situation flexibility in methods and activities was the key in trying to bridge the real issues in students' lives with some related issues in social studies. Classes were ungraded; no texts were assigned but several copies each of many different books were provided. In this kind of approach it was necessary for the instructor to have a plan for the day but events in and out of the classroom were seized upon to teach about current issues and their antecedents.

Many different topics formed the basis for instruction such as voting in Oklahoma, Communism and Capitalism, presidential succession, the space frontier, the U. S. Bill of Rights, the French Revolution of 1789, the Russian Revolution of 1917, differences between English and Spanish ways of colonization, Korea, and others. Aids provided for social studies besides books included newspapers, periodicals, maps, pamphlets, movies, pertinent television programs, charts, and sample ballots. Actual instruction was provided through individual assignments, questions for class discussions, lectures, written reports, panel discussions, and debates.

The major resources used were:

Clark, Thomas D.; Compton, Ray; and Hendrickson, Gladys. Freedom's Frontier. Chicago: Lyons and Carnahan, Inc., 1962. 816 pp.

Cutright, Prudence; Durland, Jr., Loyal; Anderson, J. Hubert; and Brooks, John J. *Living Together as World Neighbors*. New York: The Macmillan Co., 1959. 502 pp.

Gardner, William E. *West's Story of Our Country*. Boston: Allyn and Bacon, Inc., 1963. 658 pp.

Glendinning, Robert M; Tiegs, Ernest W.; and Adams, Fay. *Your Country and the World*. Boston: Ginn and Company, 1958. 511 pp.

Haefner, John H.; Bruce, Harold R.; and Carr, Robert K. *Our Living Government*. Chicago: Scott, Foresman and Company, 1960. 679 pp.

Jewitt, Arno; Edman, Marion; Scannell, Ruth; and McKee, Paul. *Journeys into America*. Boston: Houghton Mifflin Co., 1961. 662 pp.

McGuire, Edna and Partwood, Thomas B. *Our Free Nation*. New York: The Macmillan Co., 1961. 756 pp.

McReynolds, Edwin C.; Marriott, Alice; and Faulconer, Estelle. *Oklahoma, The Story of Its Past and Present*. Norman: University of Oklahoma Press, 1961. 465 pp.

Mackey, Margaret G. *Your Country's Story*. Boston: Ginn and Company, 1953, 1957. 560 pp.

Morris, John W. *Oklahoma Geography*. 3rd ed. Oklahoma City: Harlow Publishing Corporation, 1961. 178 pp.

Patterson, S. Howard and Little, A. W. Selwyn. *Problems in American Democracy*. 4th ed. New York: The Macmillan Co., 1961. 658 pp.

Posey, Rollin Bennett. *Civics for Young Americans*. Evanston, Illinois: Row, Peterson and Company, 1960. 456 pp.

Pounds, Norman J. C. and Jones, Emlyn D. *Beyond the Oceans, Eurasia, Africa, Australia*. New York: Rand McNally and Company, 1961. 471 pp.

Quillen, I. James and Krug, Edward. *Living in Our America*. Chicago: Scott, Foresman and Company, 1961. 704 pp.

Southworth, Gertrude Van Duyn and Southworth, John Van Duyn. *The Story of Our America*. Syracuse, New York: Iroquois Publishing Company, Inc., 1960. 868 pp.

Steen, Ralph W. *Government by the People*. Austin, Texas: The Steck Company, 1959. 288 pp.

Steen, Ralph W. *The United States--A History*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1959. 568 pp.

Thornton, H. V. and Aldrich, Gene. *The Government of Oklahoma*. Oklahoma City: Harlow Publishing Corporation, 1960. 366 pp.

Wilder, Howard B.; Ludlum, Robert P.; and Brown, Harriett McCune. *This is America's Story*. Boston: Houghton Mifflin Co., 1960. 728 pp.

MATHEMATICS AND SCIENCE

The extremes in prior experiences of students in mathematics and science ranged from a student who had virtually no previous study of mathematics and science to a student who had three years of science and four years of mathematics. Another descriptive categorization of students derived from their apparent motivation to learn. One group of students tried to learn as much as possible. A second group wanted to obtain just sufficient skill to get a job. And a third group did not truly become a part of the program. In this circumstance, personal experiences and classroom objects and equipment were used to relate subject matter to the experiences and interests of the students.

There was and is very much subject matter from which to choose in a combination mathematics and science offering. Topics from biology included a unit on how plants grow and a unit on the animal kingdom. Topics from earth science included land formations, atmosphere, and weather along with material from geography and geology. Two units from physics were matter and energy, and force.

From business mathematics the students studied credit and various area and volume measurements that were useful in their other work. Considerable attention was given to review and reenforcement of learning of the fundamental operations with work with whole numbers and decimal and common fractions. There was also some application of algebraic concepts for those who needed this instruction.

Along with the usual classroom activities the students took a field trip to Kirkpatrick Planetarium and solved practical problems such as making out income tax returns and payrolls. Programed materials used included the Craig Reader Math Program and Units I through VIII for the Univox Teaching Machine. Complementing these resources were transparencies, specimens, a germination table, and an aquarium. The following resources were available:

Axelrod, Aaron. Machine Shop Mathematics. 2nd ed. New York: McGraw-Hill Book Co., Inc., 1951. 359 pp.

Brinckerhoff, Richard; Cross, Burnett; Watson, Fletcher; and Brandwein, Paul F. The Physical World. 2nd ed. New York: Harcourt, Brace and World, Inc., 1958. 497 pp.

Dull, Charles E.; Metcalfe, H. Clark; and Williams, John E. Modern Chemistry. New York: Holt, Rinehart and Winston, Inc., 1958. 696 pp.

Dull, Charles E.; Metcalfe, H. Clark; and Williams, John E. Modern Physics. New York: Holt, Rinehart and Winston, Inc., 1958. 696 pp.

General Science Charts. Chicago: The Welsh Scientific Company, 1955. (Set of 40)

Harbeck, Richard M. and Johnson, Lloyd K. Earth and Space Science. New York: Holt, Rinehart and Winston, Inc., 1965. 296 pp.

Hart, Walter, W.; Schult, Veryl; and Bristol, James D. New First Algebra. Boston: D. C. Heath and Company, 1962. 386 pp.

McMackin, Frank J. and Shaver, John H. The Mathematics of the Shops. Princeton, New Jersey: D. Van Nostrand Co., Inc., 1947. 467 pp.

Marks, John L.; Smart, James R.; and Purdy, C. Richard. Understanding and Using Sets. Boston: Ginn and Company, 1962. 95 pp.

Physics Charts. Chicago: W. M. Welch Manufacturing Company, 1952. (60 color charts)

Sheet Metal Mathematics. Albany, New York: The New York State Vocational and Practical Arts Association.

COMMUNICATIVE SKILLS

It appeared reasonably certain that students selected for this program had arrived at the personal conviction that they really wanted to get ahead. It was apparent, too, that what was needed was an informal, flexible program in reading, writing, speaking, and listening in activities that covered a wide range of difficulty and many different types of material.

Instruction was planned around many different communicative skills. There was work on reading for enjoyment, for understanding, for speed, and for information. Other units of work were following directions, spelling, reference materials, word recognition, vocabulary, capitalization, punctuation, handwriting, parts of speech, sentence structure, outlines, organizing and reporting, letter writing, speaking, telephone, listening skills, and drama.

Many different kinds of activities were developed under these topics, all tailored as well as possible to help a student individually. This instruction was supported by many resources. There were a half-dozen different types of reading machines, several different film and film-strip sets, reading laboratory materials, programed materials, 20 different reading textbooks, approximately 200 different paperbacks, materials for learning correct expression, and reference materials. Some specific resources were:

Blumenthal, Joseph C. English 2600. New York: Harcourt, Brace and World, Inc., 1962. 439 pp.

Blumenthal, Joseph C. English 3200. New York: Harcourt, Brace and World, Inc., 1962. 535 pp.

Craig Reading Laboratory.

E. D. L. Reading Laboratory.

SRA Reading Laboratory. (Sixth through twelfth grade level.)

Stewart, Marie M.; Lanham, Frank W.; and Zimmer, Kenneth. College English and Communication. New York: McGraw-Hill Book Company, 1964. 532 pp.

Supporting Services

In order to increase the variety and quality of experiences and to encourage greater interest in the program, certain extra-class activities were developed. Each is described briefly in this section.

THE SPEAKER'S BUREAU

The class in communication skills organized a speakers' bureau. Members of the bureau were invited to speak in different towns of the state.

The panel of speakers consisted of volunteers who had received coaching in the techniques of speaking. In all, six boys and six girls participated. The presentations were as informal as possible under the conditions imposed by size of the audiences and physical arrangements of the rooms. Questions from the audience were encouraged, and in most cases these questions induced spontaneous discussion.

Students who participated in these activities seemingly enjoyed the chance to discuss frankly the causes of their initial dropping out of school, the training programs in which they were enrolled, and their future plans. A schedule of the visits made by the speaker's bureau is shown in Table B-1.

ENRICHMENT CLASSES

Special sessions of enrichment classes were scheduled for all students who were enrolled in academic subjects. These sessions which were conducted by regular staff members of Central High School included music, speech, family finance, creative writing, and art.

The objectives of the enrichment activities were to: (a) offer the students insight and appreciation of the cultural aspects of their environment; (b) expose them to the functional expression of art, music, speech, and writing; (c) promote realistic planning and use of financial resources; and (d) relieve the routine involved in the more traditional academic activities.

TABLE B-1. SPEAKER'S BUREAU INFORMATION

Where	Audience	Type of meeting	Number of speakers	Size of audience
Oklahoma State University Stillwater	Phi Delta Kappa	Luncheon	4	65
Jackson Jr. High Oklahoma City	Special Education Group	Special Assembly	4	200
Maud High School Maud, Oklahoma	High School	Special Assembly	4	225
Oklahoma State University Stillwater	Oklahoma Adult Education Association	Convention	2	250
Allen High School Allen, Oklahoma	High School	Special Assembly	5	285
Holdenville High Holdenville, Oklahoma	High School	Special Assembly	4	500

Each topic was taught daily for one week, with each session lasting from thirty to forty-five minutes. By interspersing these activities with the established routine from the last week of October to the first week of December, a break was made in a rather intense schedule of training. All academic and combination students took part in these activities before the termination of the class with the shortest training period. (December 19, 1964.)

ASSEMBLIES

Two assemblies were held for the purpose of giving students the opportunity to hear reputable personalities talk about topics of common interest.

Lieutenant Governor Winters spoke to the group about the demands of the competitive world of work and suggested ways for individuals to further their interests in such a world. He drew a close parallel between the limited circumstances that were his during his youth and the deprivation that many in the program had experienced.

About a month later, the public relations director for the Western Electric Company of Oklahoma City addressed the student body. He talked about employer-employee relations and how the implications imposed by technological change--mass production, changing job patterns, higher qualifications for jobs--had affected this relationship.

EXTRA-SCHOOL ACTIVITIES

At the suggestion of the research team, Mrs. Helen King, a volunteer worker at the Central YWCA encouraged, organized, and sponsored social and cultural activities for the enrollees of the project. She appeared before the student council on two occasions and told them of the various activities which the YWCA had organized for them. On the second visit she polled the students to determine their interests. Basketball and bowling proved to be the two most successful activities.

THE STUDENT COUNCIL

Efforts were made early in the project to organize a functional student council which would represent all students who were enrolled. Each skill area and academic section elected a delegate to the council. Meetings were called for the purposes of considering a specific predetermined question or for attempting to work with the YWCA in the program of extra-class activities.

Counseling Services

There were two sources of counseling services to students in this program. In-school counseling services were provided by a counselor on the program's school staff. Out-of-school counseling services were provided by the Oklahoma Employment Security Commission.

IN-SCHOOL COUNSELING SERVICES

In-school counseling was predicated upon having a staff of teachers who could develop a classroom atmosphere of understanding and acceptance. School problems that required attention were homework and study habits, and, for students in the academic program and the combination academic and vocational program, concern with progress toward meeting graduation requirements.

Nonacademic problems of these students revolved around inadequate funds, transportation, baby sitters, pregnancies, and illnesses.

As this program progressed, students assumed more responsibility for their actions and adjusted to the new requirements made of them. It seemed that when they felt someone had a genuine interest in them, they forgot their resentment over past school experiences and welcomed this opportunity to seek their own advancement.

OUT-OF-SCHOOL COUNSELING SERVICES

These counseling services were designed to be supportive of the students in managing their affairs so that they could attend classes. Mostly, this meant counseling on nonacademic problems. These services were provided by five employment counselors who were under the supervision of a State Counseling Specialist, all from the Oklahoma Employment Security Commission.

The reader is reminded here that the research objective of this project was to compare the effectiveness of three basic instructional formats in producing socially desirable changes in subjects. Counseling services, as such, applied to all groups and were not designed to be evaluated separately by groups.

APPENDIX C

INSTRUMENTATION

INSTRUMENTATION

For purposes of data collection, this study involved the use of several instruments which were selected by the research team. Several other instruments were prepared locally. The following instruments were selected for use in the project.

General Aptitude Test Battery, Form B-1002. The battery was developed and is widely operational in the occupational counseling program of the United States Employment Service and has been released for use by State Employment Services. The GATB yields nine aptitude scores. Titles of the subtests and their respective test-retest reliability estimate are: .80 + for general intelligence, verbal aptitude, numerical aptitude, and spatial aptitude; .70 + for clerical aptitude, form perception, motor coordination, and manual dexterity; and .60 for finger dexerity.

Sequential Tests of Educational Progress, Form 3-A and 3-B. This battery was administered for the purpose of measuring academic achievement in five areas: reading, writing, social studies, mathematics, and science. The tests in all these areas are basically power tests, rather than speed tests. Median reliabilities reported for each test estimated by the Kuder-Richardson Formula 20 are .915 for reading, 865 for writing, .850 for science, .835 for mathematics, and .890 for social studies.

California Test of Personality, Form AA and Form BB, Secondary Level. This instrument was selected for measurement of "life adjustment." A total adjustment score is derived by simple addition of scores for the two major sections of the test, "personal adjustment" and "social adjustment." The Personal Adjustment section is based on feelings of personal security. It yields six component part scores: self-reliance, sense of personal worth, sense of personal freedom, feeling of belonging, withdrawing tendencies and nervous symptoms. The Social Adjustment section is based on feelings of social security. Component part scores are: social standards, social skills, anti-social tendencies, family relations, school relations and community relations. Reported reliability coefficients for the several components range from .70 to .97; the coefficient for total adjustment is .96.

Kuder _Preference_ _Record_, Personal Form A. This instrument was selected to measure interest in social situations related to work. It is composed of five scales which measure different types of personal and social activities. The scales are considered to be independent and non-additive. They are: (a) preference for being active in groups, (b) preference for familiar and stable situations, (c) preference for working with ideas, (d) preference for avoiding conflict, and (e) preference for directing or influencing others. Reported reliabilities of the five scales range from .76 to .89 as computed by the Kuder-Richardson formula.

IPAT _Anxiety_ _Scale_. This instrument was selected as a means of getting clinical anxiety information rapidly, objectively and in a standard manner. The instrument yields scores of covert or hidden anxiety and overt or symptomatic anxiety. In addition, five factors which are grouped together as anxiety components are measured by the instrument. These factors include: defective integration, lack of self sentiment; ego weakness, lack of ego strength, suspiciousness, paranoid insecurity, guilt proneness, and frustative tension or id pressure. A total composite anxiety score is also derived from the instrument. Reported reliabilities are .80 + by split-half, immediate retest, and delayed test-retest procedures.

Social Class Value Orientation Inventory. This is an experimental instrument authored by Solomon Sutker, Professor of Sociology, University of Missouri at Kansas City. It yields a total score from responses to thirty-three pairs of value statements. The responses reflect either middle-class or lower class orientation. The inventory consists of four dimensions, each yielding a subtotal score. The dimensions are: (a) time orientation planning, deferring gratification (training future time vs present time); (b) control of destiny, (planning and effort vs fatalism); (c) presentation of self, (controlled and socially conscious vs uncontrolled and unconcerned); and (d) social world (non-familistic vs familistic). Preliminary data on the reliability of the SCVO, sample size of 1,007, yield a Spearman-Brown correlation of .65. On a test-retest, of 217 subjects in the study reported herein, a Pearson Product moment correlation of .47 was obtained. In another test-retest, of 97 Upward Bound Project subjects, a Pearson Product correlation was .42.

Rural-Urban Orientation Inventory. This instrument, as the one above, was also authored by Solomon Sutker, University of Missouri at Kansas City. The instrument yields a total score from responses to ten pairs of value and opinion statements. It consists of three dimensions and yields three subtotal scores. The dimensions are: individual autonomy over actions and time-use, (less need vs more need); moral attributes in man's work or nature, (neutrality vs nature superior to man's nature); and distinctive social characteristics of social density, distance, heterogeneity, institutional variety and richness, (acceptance vs resistance or acceptance of rural counterparts). Preliminary reliability data from the Spearman Brown formula with 996 subjects gives a coefficient of .56. The test-retest coefficient of 217 subjects of the study reported herein is .50.

Mellenbruch Garage Mechanic Test. This instrument was selected to measure achievement in the theory of auto-mechanics. The test yields a total score. Areas covered include: tune-up and related internal-combusion engine servicing principles, ignition, carbureation, clutch, transmission, differential and drive shaft, brakes, steering and other miscellaneous areas.

Mellenbruch Office Skills Achievement Test. This instrument is a clerical test which yields six part scores and a composite total score. The parts include: (a) business letter, (b) grammar, (c) checking, (d) filing, (e) arithmetic, and (f) written directions. Reliability studies reveal correlations ranging from .76 to .88. Validity studies have been inconclusive. The instrument was selected for use in the present study on the basis of "face" validity.

Purdue Trade Information Test in Welding. This instrument was used as a terminal achievement examination in welding. It yields only a total score. The odd-even reliability, computed on 59 cases was .91.

Purdue Tests for Machinists and Machine Operators. The instrument was used as a terminal achievement test of knowledge of general machine shop operations, practices and tools. It yields a total score.

Purdue Trade Information Test for Sheetmetal Workers. The instrument was used as a terminal achievement test in sheetmetal. It yields a total score.

Cosmetology Test. The instrument was designed as a terminal achievement test of cosmetology. It measures three general areas of theory:

science of cosmetology, practice and science of manicuring, and practice of cosmetology. The instrument is applicable for use with both Negro and non-Negro cosmetology courses. No reliability study of the test was made. The instrument was prepared by the research team by sampling items from the Cosmetology State Board Examiner's Handbook.

Every Pupil Scholarship Test in Typewriting I and II. The instrument is a typing performance test. It yields a total score from four typing problems: (a) typing accuracy, (b) tabulation, vertical and horizontal centering, (c) business letter, and (d) rough draft letter. The test was prepared by Richard F. Reicherter for the Bureau of Educational Measurements, Kansas State Teachers College, Emporia, Kansas.

Hiett Simplified Shorthand Test. The instrument is a measure of achievement of students taught by the Gregg Simplified Shorthand Method. The test yields a single score. The author bases validity on the attempt to include a sampling of essential items presented in the Gregg Shorthand Manual. Coefficients of reliability obtained from data on four small samples were .80 or higher.

Office Machine Mechanic Test. The instrument is a comprehensive teacher-made test covering the instructional material for the entire thirty-six week course. It yields a single score.

Teacher Rating of Skill Performance. The instrument was developed to measure the student's ability to perform specific tasks related to his vocational skill training. The instrument was prepared for each skill area, with varying rating items according to the numbers of tasks which were applicable to the area.

Teacher Rating of Personal Characteristics. The instrument was developed to measure student practices in the classroom or shop. It includes thirteen rating items concerning such factors as punctuality, attendance, grooming, cooperation, etc.

Initial Data Sheet. The instrument was developed to obtain basic personal background data from each subject.

School Dropout Research Interview Schedule. The instrument was developed by the research team to acquire both demographic and ecological information from the subjects. Interviews with subjects were also tape recorded and later transcribed.

Youth Opportunity Follow-Up Survey. The instrument was developed by the research team to be administered at six-month intervals following training.

Brayfield-Rothe Job Satisfaction Questionnaire. The instrument was developed to measure the subjects' satisfaction with their jobs. It yields a single job satisfaction score. The instrument is based on attitude scaling theory which assumes that job satisfaction may be inferred from an individual's attitude toward his job. A reliability coefficient of .87 was obtained when the test was administered to 231 female office employees. According to the authors, validity is based on "the nature of the items, the method of construction and it's differentiating power when applied to two groups which could reasonably be assumed to differ in job satisfaction." This instrument was administered primarily in face-to-face interviews with subjects; others were contacted by mail.

Goertzel Job Success Rating Scale, Form A. The instrument is used to obtain a measure of a subject's vocational success as viewed from the employer's position. The instrument is a Thurstone type check list consisting of twenty-five weighted descriptive items which are characteristic of poor, average, and superior workers. The employer is asked to check those items which characterize or describe the worker under consideration. Weights of the checked items are averaged to obtain one score which indicates worker performance. The validity coefficient ranged from .80 to .90.

APPENDIX D

AN APPLICATION OF REGRESSION ANALYSIS TO BEHAVIORAL RESEARCH

AN APPLICATION OF REGRESSION ANALYSIS TO BEHAVIORAL RESEARCH

The purpose of this statement is to present a mathematical model and a set of procedures having utility for the analysis of large quantities of data obtained in an experimental educational research project. The application of this approach to other large scale social science research endeavors is suggested.

The data for this discussion are taken from the main research project described elsewhere in this report. The instruments which provided the scores that are used in the illustration are outlined in Chapter II and are described briefly in Appendix C. The subjects are those defined as Time I students in Table 4 of Chapter II. With this brief statement of introduction the remainder of this presentation focuses on statistical procedures.

Overview of the Objectives

From the standpoint of statistical analyses the two primary objectives of this experimental research project were as follows: (a) to determine whether the type of training received by the subjects had an appreciable influence upon their academic and vocational achievement, social class values, interests, anxiety level, personal and social adjustment, and job success after training; and (b) to determine whether various personal and social characteristics had a measurable influence upon the same factors.

The two major objectives were approached in reverse order. Briefly, the procedure employed to achieve the second objective was to analyze each of 43 dependent variables (43 standardized posttest scores) for all subjects employing 44 continuous predictor variables and 14 categorical predictor variables in two multiple linear regression models.* This analysis identified continuous predictor variables and categorical predictor variables which significantly influenced each of the 43 posttest scores.

Then the procedure employed to achieve the first objective was to determine whether the type of training received had any measurable influence upon each of the dependent variables. This was accomplished by using single classification--five groups--analysis of covariance, employing as concomitant variables the continuous predictor variables and categorical predictor variables found to be significant in the previous analysis.

Mathematical Models and Hypotheses to be Tested

A multiple-pass procedure was followed to determine which continuous predictor variables and categorical predictor variables exerted a significant influence upon the dependent variables. First, the following linear mathematical model was used to determine which of the 44 continuous predictor variables had a significant influence upon each of the 43 dependent variables:

$$Y_j = \mu + \beta_1 X_{1j} + \beta_2 X_{2j} + \cdots + \beta_{44} X_{44j} + \epsilon_j \qquad (1)$$

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*Continuous predictor variables are the 44 independent concomitant variables used in the analyses. The categorical predictor variables are the 14 independent variables used in the analyses.

where $\beta_1, \beta_2, \ldots, \beta_{44}$ are partial regression coefficients associated with each of the 44 continuous variables listed in Table D-1; μ represents the overall mean; $j = 1 \ldots 145$, with the subscript j identifying each of the subjects posttested; and ϵ_j is a random variable. This multiple regression model and subsequent models described assume that the epsilons (ϵ's) are independent and normally distributed, with a mean of zero and a variance of sigma squared [$\epsilon \sim \text{NID}(0,\sigma^2)$].

The following 44 hypotheses were tested for each of the 43 dependent variables listed in Table D-2:

1. $H_o : \beta_1 = 0$.
2. $H_o : \beta_2 = 0$.

$\vdots \quad \vdots \quad \vdots$

43. $H_o : \beta_{43} = 0$.
44. $H_o : \beta_{44} = 0$.

The 44 null hypotheses state that the sum of squares which each possible continuous predictor variable removes after adjustment is equal to zero. In testing each of the 44 hypotheses, the sum of squares which each possible continuous predictor variable removed after first adjusting for the effect of the other 43 variables was computed to obtain an "exact" test.*

In the first pass, using Model #1, each continuous predictor variable which had a variance ratio (_F_ value) of less than 1.00 was deleted. Then, a second analysis (pass) was made for each of the 43 dependent

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*References for all the models described in this appendix are: Franklin A. Graybill, _An Introduction to Linear Statistical Models_, Volume I, New York: McGraw-Hill Book Company, Inc., 1961, Chapters 6 and 13; and Walter R. Harvey, _Least-Squares Analysis of Data with Unequal Subclass Numbers_, Washington, D. C.: United States Department of Agriculture; Agricultural Research Service, ARS-20-8, July, 1960, pp. 1-17.

TABLE D-1. CONTINUOUS VARIABLES FROM WHICH CONCOMITANT VARIABLES WERE SELECTED FOR THE ANALYSIS OF TREATMENT EFFECTS

Number	Pretest identification
	Rural-Urban Orientation Inventory
X_1	Individual Autonomy over Actions and Time Use
X_2	Moral Attributes in Man's Work or Nature
X_3	Distinctive City Characteristics of Social Density, Distance, Heterogeneity, Institutional Variety and Richness
X_4	Consistency Score
	Social Class Value Orientation Inventory
X_5	Time Orientation
X_6	Control of Destiny
X_7	Presentation of Self
X_8	Social World
	General Aptitude Test Battery, Form B-1022
X_9	Intelligence
X_{10}	Verbal Aptitude
X_{11}	Numerical Aptitude
X_{12}	Spatial Aptitude
X_{13}	Form Perception
X_{14}	Clerical Perception
X_{15}	Motor Coordination
X_{16}	Finger Dexterity
X_{17}	Manual Dexterity
	Sequential Tests of Educational Progress, Form 3-A
X_{18}	Reading
X_{19}	Writing
X_{20}	Social Studies
X_{21}	Mathematics
X_{22}	Science
	Kuder Preference Record--Personal, Form A
X_{23}	For Being Active in Groups
X_{24}	For Familiar and Stable Situations
X_{25}	For Working with Ideas
X_{26}	For Avoiding Conflict
X_{27}	For Directing or Influencing Others
	California Test of Personality, Form BB, Secondary Level
X_{28}	Self Reliance
X_{29}	Sense of Personal Worth
X_{30}	Sense of Personal Freedom
X_{31}	Feeling of Belonging

TABLE D-1. (CONTINUED)

Number	Pretest identification
X_{31}	Feeling of Belonging
X_{32}	Withdrawing Tendencies
X_{33}	Nervous Symptoms
X_{34}	Social Standards
X_{35}	Social Skills
X_{36}	Anti-Social Tendencies
X_{37}	Family Relations
X_{38}	School Relations
X_{39}	Community Relations
	IPAT Anxiety Scale
X_{40}	Defective Integration
X_{41}	Ego Weakness
X_{42}	Suspiciousness
X_{43}	Guilt Proneness
X_{44}	Frustrative Tension

variables, using only the continuous predictor variables with variance ratios of 1.00 or greater. Each continuous predictor variable which had a variance ratio too small to be significant at the five percent level was then deleted.

Then, the third analysis (pass) was made in which all continuous predictor variables not eliminated in passes one and two and the 14 categorical predictor variables were placed in the following multiple regression model for each of the 43 dependent variables:

$$\begin{aligned} Y_{ijklmnopqrstuvw} &= \mu + \beta_1 X_{1i} + \ldots + \beta_n X_{ni} \\ &+ \alpha_j + \tau_k + \theta_l + \lambda_m + \omega_n + \nu_o + \delta_p + \rho_q + \varphi_r + \\ &\pi_s + \psi_t + \gamma_u + \zeta_v + \eta_w + \epsilon_{ijklmnopqrstuvw}, \end{aligned} \tag{2}$$

where the 14 categorical predictor variables (with their designated

TABLE D-2. DEPENDENT VARIABLES EMPLOYED IN THE ANALYSIS OF POSTTEST SCORES

Number	Posttest identification
	Sequential Tests of Educational Progress, Form 3-B
Y_1	Reading
Y_2	Writing
Y_3	Social Studies
Y_4	Mathematics
Y_5	Science
	Kuder Preference Record--Personal, Form A
Y_6	For Being Active in Groups
Y_7	For Familiar and Stable Situations
Y_8	For Working with Ideas
Y_9	For Avoiding Conflict
Y_{10}	For Directing or Influencing Others
	California Test of Personality, Form AA, Secondary Level
Y_{11}	Self Reliance
Y_{12}	Sense of Personal Worth
Y_{13}	Sense of Personal Freedom
Y_{14}	Feeling of Belonging
Y_{15}	Freedom from Withdrawing Tendencies
Y_{16}	Freedom from Nervous Symptoms
Y_{17}	Personal Adjustment Sub-Total
Y_{18}	Social Standards
Y_{19}	Social Skills
Y_{20}	Freedom from Anti-Social Tendencies
Y_{21}	Family Relations
Y_{22}	School Relations
Y_{23}	Community Relations
Y_{24}	Social Adjustment Sub-Total
Y_{25}	Total Adjustment
	IPAT Anxiety Scale
Y_{26}	Defective Integration
Y_{27}	Ego Weakness
Y_{28}	Suspiciousness
Y_{29}	Guilt Proneness
Y_{30}	Frustrative Tension
Y_{31}	Covert Anxiety
Y_{32}	Overt Anxiety
Y_{33}	Total Anxiety

TABLE D-2. (CONTINUED)

Number	Posttest identification
	Rural-Urban Orientation Inventory
Y_{34}	Individual Autonomy over Actions and Time Use
Y_{35}	Moral Attributes in Man's Work or Nature
Y_{36}	Distinctive City Characteristics of Social Density, Distance, Heterogeneity, Institutional Variety and Richness
Y_{37}	Total Score
Y_{38}	Consistency Score
	Social Class Value Orientation Inventory
Y_{39}	Time Orientation
Y_{40}	Control of Destiny
Y_{41}	Presentation of Self
Y_{42}	Social World
Y_{43}	Total Score

Greek script symbols) are identified in Table D-3. The number of classifications employed for each categorical predictor variable is also given in Table D-3. Again, there were 43 dependent variables employed in the analysis, using Model #2.

The tests of hypotheses in the third analysis (pass) for each of the 43 dependent variables involved testing each continuous predictor variable which was significant at the five percent level in the second pass. Also, the tests of hypotheses entailed a test for each of the 14 categorical predictor variables, as follows:

1. $H_o : \alpha_1 = \alpha_2$.
2. $H_o : \tau_1 = \tau_2$.
3. $H_o : \theta_1 = \theta_2 = \theta_3$.
4. $H_o : \lambda_1 = \lambda_2 = \lambda_3$.
5. $H_o : \omega_1 = \omega_2 = . . . = \omega_4$.

TABLE D-3. CATEGORICAL VARIABLES EMPLOYED IN THE ANALYSIS OF POSTTEST SCORES

Variable number	Greek script representing each variable		Number of classifications used	Identification
1	α	(alpha)	2	Sex
2	τ	(tau)	2	Race
3	θ	(theta)	3	Marital Status
4	λ	(lambda)	3	Father's Occupation
5	ω	(omega)	4	Parent's Marital Status
6	ν	(nu)	3	Church Attendance
7	δ	(delta)	9	Number of Schools Attended
8	ρ	(rho)	6	Number of Activities
9	φ	(phi)	4	Principal Environment
10	π	(pi)	5	Year Dropped Out-of-School
11	ψ	(psi)	4	Self Rating on Intelligence
12	γ	(gamma)[a]	Actual Number	Number of Respondent's Children
13	ζ	(zeta)[a]	Actual Number	Number of Siblings
14	η	(eta)[a]	Actual Number	Highest Grade Completed in School

[a] Since these variables were coded by actual number they entered the regression model as continuous variables. However the text discussion carries them as part of 14 categorical variables.

6. $H_o : \upsilon_1 = \upsilon_2 = \upsilon_3$.

7. $H_o : \delta_1 = \delta_2 = \ldots = \delta_9$.

8. $H_o : \rho_1 = \rho_2 = \ldots = \rho_6$.

9. $H_o : \varphi_1 = \varphi_2 = \ldots = \varphi_4$.

10. $H_o : \pi_1 = \pi_2 = \ldots = \pi_5$.

11. $H_o : \psi_1 = \psi_2 = \ldots = \psi_4$.

12. $H_o : \gamma_1 = \gamma_2 = \ldots = \gamma_n$.*

13. $H_o : \zeta_1 = \zeta_2 = \ldots = \zeta_n$.*

14. $H_o : \eta_1 = \eta_2 = \ldots = \eta_n$.*

The hypotheses for each of the 14 categorical predictor variables state that the posttest scores for each respective dependent variable are equal for all levels of each of the 14 main effects (categorical predictor variables).

Each continuous or categorical predictor variable which had a variance ratio too small to be significant at the five percent level on each of the 43 dependent variables was eliminated. Then, a fourth analysis (pass) was made, using the remaining significant variables in the multiple covariance model (Model #3) for the purpose of testing the treatment effects.

In other words, Model #3 includes the main effect of "type of training" (designated by the symbol κ) in addition to the continuous and categorical predictor variables found to be significant in Model #2. Thus, the following null hypothesis was tested in the fourth analysis:

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*See footnote to Table D-3 for the way these variables were actually analyzed which in fact changes the hypothesis in each case to that tested by Model #1.

1. $H_o : \kappa_1 = \kappa_2 = \kappa_3 = \kappa_4 = \kappa_5$, (3)

which states that the posttest scores are identical for subjects in each of the five types of experimental and control groups.

An illustrative example of the foregoing multi-pass procedure employed to select the significant continuous and categorical predictor variables will be given below to show precisely the steps involved. The social studies score (Y_3) obtained on the Sequential Tests of Educational Progress will be used for illustrative purposes.

(a) Pass I. $R^2 = .82$. Table D-4 indicates that 17 of the 44 continuous predictor variables had variance ratios of 1.00 or more in the first analysis. The 27 variables with variance ratios of less than 1.00 were then deleted from Model #1 for the second pass.

(b) Pass II. $R^2 = .81$. When the second analysis was made with 17 continuous predictor variables only three (X_1, X_{27}, and X_{34}) of the 17 were not significant at the five percent level (Table D-5). The 14 significant variables were retained for inclusion in Model #2 for the third pass.

(c) Pass III. $R^2 = .86$. Table D-6 shows that only three of the 14 categorical predictor variables (α sex; φ, principal environment; and γ, number of children) were significant at the five percent level and 11 of the 14 continuous predictor variables were significant at the five or higher percent level (X_{24}, X_{26}, and X_{43} were not significant at the five percent level). The three categorical variables and 11 continuous variables were retained for inclusion in Model #3 for the fourth pass.

TABLE D-4. ANALYSIS OF VARIANCE OF THE SOCIAL STUDIES SCORE (PASS I)

Source of variation	Degrees of freedom	Sum of squares	Mean square	Calculated variance ratio
Total	146[a]	312,167		
R (μ)	1	294,302		
R (due to Model/μ)	44	14,750		
R [β_1 (adjusted)]	1	64.08	64.08	2.08
R [β_2 (adj.)]	1	21.82	21.82	.71
R [β_3 (adj.)]	1	.01	.01	.00
R [β_4 (adj.)]	1	8.43	8.43	.27
R [β_5 (adj.)]	1	266.80	266.80	8.65
R [β_6 (adj.)]	1	303.46	303.46	9.84
R [β_7 (adj.)]	1	167.12	167.12	5.42
R [β_8 (adj.)]	1	10.10	10.10	.33
R [β_9 (adj.)]	1	77.87	77.87	2.52
R [β_{10} (adj.)]	1	3.15	3.15	.10
R [β_{11} (adj.)]	1	75.88	75.88	2.46
R [β_{12} (adj.)]	1	.01	.01	.00
R [β_{13} (adj.)]	1	.53	.53	.02
R [β_{14} (adj.)]	1	.02	.02	.00
R [β_{15} (adj.)]	1	.39	.39	.01
R [β_{16} (adj.)]	1	18.82	18.82	.61
R [β_{17} (adj.)]	1	.01	.01	.00
R [β_{18} (adj.)]	1	196.56	196.56	6.37
R [β_{19} (adj.)]	1	3.87	3.87	.13
R [β_{20} (adj.)]	1	103.32	103.32	3.35
R [β_{21} (adj.)]	1	17.04	17.04	.55
R [β_{22} (adj.)]	1	26.72	26.72	.87
R [β_{23} (adj.)]	1	30.66	30.66	.99
R [β_{24} (adj.)]	1	148.56	148.56	4.82
R [β_{25} (adj.)]	1	19.32	19.32	.63
R [β_{26} (adj.)]	1	76.16	76.16	2.47

TABLE D-4. (CONTINUED)

Source of variation	Degrees of freedom	Sum of squares	Mean square	Calculated variance ratio
R [β_{27} (adj.)]	1	52.10	52.10	1.69
R [β_{28} (adj.)]	1	23.94	23.94	.78
R [β_{29} (adj.)]	1	3.86	3.86	.13
R [β_{30} (adj.)]	1	.23	.23	.01
R [β_{31} (adj.)]	1	45.51	45.51	1.48
R [β_{32} (adj.)]	1	19.88	19.88	.64
R [β_{33} (adj.)]	1	19.57	19.57	.63
R [β_{34} (adj.)]	1	132.57	132.57	4.30
R [β_{35} (adj.)]	1	1.57	1.57	.05
R [β_{36} (adj.)]	1	10.80	10.80	.35
R [β_{37} (adj.)]	1	2.19	2.19	.07
R [β_{38} (adj.)]	1	67.29	67.29	2.18
R [β_{39} (adj.)]	1	7.47	7.47	.24
R [β_{40} (adj.)]	1	29.85	29.85	.97
R [β_{41} (adj.)]	1	89.92	89.92	2.92
R [β_{42} (adj.)]	1	3.71	3.71	.12
R [β_{43} (adj.)]	1	112.49	112.49	3.65
R [β_{44} (adj.)]	1	66.49	66.49	2.16
Error	101	3,115.23	30.84	

[a] At this stage of the analysis N equalled 146.

$R^2 = .82$

TABLE D-5. ANALYSIS OF VARIANCE OF THE SOCIAL STUDIES SCORES (PASS II)

Source of variation	Degrees of freedom	Sum of squares	Mean square	Calculated variance ratio
Total	146[a]	312,167		
R (μ)	1	294,302		
R (due to Model /μ)	17	14,408		
R [β_1 (adj.)]	1	92.56	92.56	3.43
R [β_5 (adj.)]	1	254.55	254.55	9.42[b]
R [β_6 (adj.)]	1	333.29	333.29	12.34[b]
R [β_7 (adj.)]	1	378.11	378.11	14.00[b]
R [β_9 (adj.)]	1	792.85	792.85	29.35[b]
R [β_{11} (adj.)]	1	293.26	293.26	10.86[b]
R [β_{18} (adj.)]	1	787.29	787.29	29.14[b]
R [β_{20} (adj.)]	1	513.10	513.10	18.99[b]
R [β_{24} (adj.)]	1	291.36	291.36	10.79[b]
R [β_{26} (adj.)]	1	119.95	119.95	4.44[c]
R [β_{27} (adj.)]	1	58.76	58.76	2.18
R [β_{31} (adj.)]	1	141.47	141.47	5.24[c]
R [β_{34} (adj.)]	1	91.91	91.91	3.40
R [β_{38} (adj.)]	1	201.36	201.36	7.45[b]
R [β_{41} (adj.)]	1	170.47	170.47	6.31[c]
R [β_{43} (adj.)]	1	109.45	109.45	4.05[c]
R [β_{44} (adj.)]	1	133.98	133.98	4.96[c]
Error	128	3,457.84	27.01	

[a] At this stage of the analysis N equalled 146. One subject was lost at this point so that in subsequent analyses N equals 145.

[b] Indicates significance at the one percent level

[c] Indicates significance at the five percent level

$R^2 = .81$

TABLE D-6. ANALYSIS OF VARIANCE OF THE SOCIAL STUDIES
(PASS III)

Source of variation	Degrees of freedom	Sum of squares	Mean square	Calculated variance ratio
Total	145	310,231		
R (μ)	1	292,366		
R (due to Model /μ)	51	15,398		
R [α (adj.)]	1	189.69	189.69	7.15[a]
R [τ (adj.)]	1	25.74	25.74	.97
R [θ (adj.)]	2	33.45	16.72	.63
R [λ (adj.)]	2	124.37	62.18	2.34
R [ω (adj.)]	3	111.32	37.11	1.40
R [ν (adj.)]	2	76.24	38.12	1.44
R [δ (adj.)]	8	182.37	22.80	.86
R [ρ (adj.)]	5	125.31	25.06	.94
R [φ (adj.)]	3	266.92	88.97	3.35[b]
R [π (adj.)]	4	53.07	13.27	.50
R [ψ (adj.)]	3	20.66	6.89	.26
R [γ (adj.)]	1	183.15	183.15	6.90[b]
R [ζ (adj.)]	1	81.89	81.89	3.09
R [η (adj.)]	1	17.28	17,28	.65
R [β_5 (adj.)]	1	206.77	206.77	7.79[a]
R [β_6 (adj.)]	1	185.10	185.10	6.98[a]
R [β_7 (adj.)]	1	354.65	354.65	13.37[a]
R [β_9 (adj.)]	1	779.16	779.16	29.37[a]
R [β_{11} (adj.)]	1	346.58	346.58	13.07[a]

TABLE D-6. (CONTINUED)

Source of variation	Degrees of freedom	Sum of squares	Mean square	Calculated variance ratio
R [β_{18} (adj.)]	1	1,188.42	1,188.42	44.80[a]
R [β_{20} (adj.)]	1	166.51	166.51	6.28[b]
R [β_{24} (adj.)]	1	54.07	54.07	2.04
R [β_{26} (adj.)]	1	56.30	56.30	2.12
R [β_{31} (adj.)]	1	209.67	209.67	7.90[a]
R [β_{38} (adj.)]	1	157.81	157.81	5.95[b]
R [β_{41} (adj.)]	1	267.22	267.22	10.07[a]
R [β_{43} (adj.)]	1	63.74	63.74	2.40
R [β_{44} (adj.)]	1	166.92	166.92	6.29[b]
Error	93	2,467.05	26.53	

[a] Indicates significance at the one percent level.

[b] Indicates significance at the five percent level.

$R^2 = .86$

(d) Pass IV.* $R^2 = .83$. In this last analysis the subjects were classified into five groups (three experimental and two control groups) to determine whether treatment had a significant impact upon each of the 43 dependent variables.

Table D-7 reveals that there are significant differences among the five treatment groups in their social studies scores. One of the

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*With large samples and with large computer capacity, Passes I, II, and III could be combined into one pass, followed by the final covariance analysis.

TABLE D-7. ANALYSIS OF COVARIANCE OF THE SOCIAL STUDIES SCORES
(PASS IV)

Source of variation	Degrees of freedom	Sum of squares	Mean square	Calculated variance ratio
Total	145	310,231		
R (μ)	1	292,366		
R (due to Model/μ)	20	14,741		
R [κ (adj.)]	4[a]	428.88	107.22	4.26[b]
R [α (adj.)]	1	604.70	604.70	24.00[b]
R [φ (adj.)]	3	14.77	4.92	.20
R [γ (adj.)]	1	130.80	130.80	5.19[c]
R [β_5 (adj.)]	1	169.91	169.91	6.74[c]
R [β_6 (adj.)]	1	256.86	256.86	10.20[b]
R [β_7 (adj.)]	1	267.26	267.26	10.61[b]
R [β_9 (adj.)]	1	911.49	911.49	36.18[b]
R [β_{11} (adj.)]	1	516.97	516.97	20.52[b]
R [β_{18} (adj.)]	1	1,263.53	1,263.53	50.15[b]
R [β_{20} (adj.)]	1	359.76	359.76	14.28[b]
R [β_{31} (adj.)]	1	92.21	92.21	3.66
R [β_{38} (adj.)]	1	102.38	102.38	4.06[c]
R [β_{41} (adj.)]	1	240.09	240.09	9.53[b]
R [β_{44} (adj.)]	1	96.17	96.17	3.82
Error	124	3,123.95	25.19	

[a] Test of treatment groups on social studies scores.

[b] Indicates significance at the one percent level.

[c] Indicates significance at the five percent level.

$R^2 = .83$

categorical variables (φ, principal environment) is not significant at the five percent level and two of the continuous variables (X_{31} and X_{44}) are not significant at the five percent level. In all, Model #3 explains 83 percent ($R^2 = .83$) of the variability in the social studies scores.

Summary of Methodological Procedure

A rather difficult task any researcher faces in drawing valid conclusions and inferences about the effect of any treatment, such as type of training, is the identification of other relevant variables which have a significant impact on observations. Ideally, all important variables should be controlled, leaving existing differences explainable only by the treatment.

Frequently, the researcher depends upon current literature to identify relevant control variables. Sometimes, he may intuitively select these variables. Nevertheless, these selection processes often fail when a unique population is sampled or when a unique study is contemplated, since there are no precedents to guide the selection and identification process.

The method devised in this experimental educational research project for selecting relevant control variables from large numbers of potential control variables efficiently accomplishes this objective.

APPENDIX E

SUMMARY OF RELATED DOCTORAL DISSERTATIONS

SUMMARY OF RELATED DOCTORAL DISSERTATIONS

Seven doctoral studies tangential to the major research project have been completed. These investigations either explored the dimensions of the dropout problem in Oklahoma City or utilized data or subjects from the Ford Project for analyses and experiments not incorporated in the original project design. The following overview of the tangential studies is presented before the studies are discussed in greater detail. Levan (13) devoted a considerable portion of his study to an examination of the dimensions of the school dropout problem in Oklahoma City. Roberts (18) examined various aspects of achievement in the 1963-64 Manpower Development and Training Program conducted at Central High School in Oklahoma City. That program was utilized as a pilot project for the program sponsored by the Ford Foundation. Willis (30) evaluated an experimental human relations training program which utilized as subjects a number of the subjects in the Ford Project. One of the groups in Frazier's (9) study was drawn from Ford Project subjects. This group was compared with a group of graduates of conventional high school vocational training programs on a variety of criteria pertaining to academic achievement, vocational class achievement, and initial job success. Quinn (17) studied personal and social adjustment change in the various experimental and control groups during the course of the training program. Two studies, those of Wallace (29) and Boggs (2), were concerned with job success during the early stage of the follow-up period. Wallace studied job satisfaction of the experimental and control groups for the early program finishers. Boggs examined a number of criteria related to vocational success for the experimental and control groups at the end of one year following the completion of training programs.

The following discussion of tangential studies will be limited to a brief description of the purpose of the study, the design of the study, and the more important findings. Statistical significance in all cases represents a probability level of .05 or lower. For those studies utilizing subjects or data from the Ford Project, additional description relative to groups, subjects, measuring instruments, data, etc., may be obtained by examining the main body of this report.

Levan's (13) description of the magnitude and dimensions of Oklahoma City's dropout problem is of particular relevance to the Ford Project. His principal findings in this respect are summarized as follows:

(a) In 1962 Oklahoma City graduated 761 students out of every 1,000 who started in the fifth grade. The city's graduation rate exceeded seventy-six percent.

(b) Of the 1,074 persons who withdrew from the public schools of Oklahoma City in 1961-62, twenty-seven percent withdrew at the tenth grade level. Forty-seven percent of the total withdrawals occurred during the second quarter of the school year. There was a significant difference between observed and expected withdrawals by quarters of the school year.

(c) Marriage, lack of interest, and work were the chief reasons given by dropouts for withdrawal.

(d) Eighty percent of the city's secondary dropouts did not participate in any formal school-sponsored activities.

(e) Significant differences were found for the following comparisons: On the basis of an above average versus below average dichotomy of grades received, more dropouts occurred within the below average category than expected. A comparison by sex showed more male dropouts than expected.

(f) Every sector of the city had a dropout problem, but the magnitude of the problem varied greatly within the city. An area forming an east-west axis across the central part of the city had the most severe problem. This area had low elementary student intelligence test scores, high elementary student mobility, low parental income, low parental educational attainment, and high parental unemployment.

The 1963-64 Manpower Development and Training Act program conducted at Central High School in Oklahoma City was utilized as a pilot project for the major project supported by the Ford Foundation. Roberts (18) studied characteristics associated with program completion, overall success in the program, academic achievement, and achievement in vocational classes for the group of students enrolled in the 1963-64 program.

The 1963-64 MDTA program provided training for each student in one of the following skill areas: (a) stenography, (b) cosmetology, (c) auto mechanics, (d) machines, (e) welding, and (f) sheet metal. All trainees attended academic courses as needed to complete requirements for high school graduation. Academic courses offered were (a) mathematics, (b) communicative skills, (c) science, and (d) social studies. The study included 168 trainees who remained in the training program in October out of 205 trainees who started training in August. Selection criteria specified that trainees must be between the ages of 18 and 22, either unemployed or underemployed, and must have been a high school dropout for at least two years.

The following background characteristics were selected for study by Roberts and were dichotomized as indicated:

(a) Rural or urban background - A subject was classified as "rural" if prior to dropping out he had lived 50 percent or more of his life in a rural community or small town of under 2,500 population.

(b) Stable or broken home background - A subject was classified as having come from a "stable" home if his parents had not divorced.

(c) Mobile or non-mobile background - A subject was classified as "mobile" if he had moved from one area to another five oe more times, or if moves had necessitated five or more school transfers.

(d) Age - 20 years and above and 19 years and below

(e) Sex - male and female

(f) Race - white and non-white

An analysis of differences in mean GATB "G" scores for the above subgroups disclosed no significant differences in general intelligence test scores except for the racial subgroups, between which the difference significantly favored the white subgroup.

When subjects who withdrew from the MDTA program were compared with the group completing the training program, a significant difference in favor of program finishers was found to be associated with the following background characteristics: stable home, female, 20 years of age and above, and white. Rural-urban background and mobile or non-mobile background were not significantly related to program completion.

Instructors assigned trainees overall ratings of "successful" or "unsuccessful" in the training program. An analysis of these ratings for the two subgroups formed on the basis of rural or urban backgrounds found no significant difference.

Roberts attempted to statistically control for differences in academic aptitude and prior achievement as he evaluated differences in academic achievement between each of the two subgroups of the six dichotomized classifications shown above. Academic achievement gains were studied by means of October and May administrations of the STEP battery. With academic aptitude and prior achievement controlled in the analysis of covariance, no significant differences in academic achievement were found.

Differences in achievement in vocational courses were found in only four of seventy-five possibilities. Significant differences were found between the racial subgroups on work meaning and reasoning scores of the stenographic test and on the cosmetology test. These differences were attributed to lower aptitudes for the non-white participants. Significant differences were found between the stable and broken home background subgroups on the machines test, with the group whose parents had not divorced doing better.

Willis (30) used programmed dyadic human relations training material, the General Relationships Improvement Program, with a selected group of the Ford Project subjects. Within subjects who received only academic training selected for the experiment, pairings were initially made to form same-sex pairs. Instructors were consulted to ensure that none of the pairings included two people who overtly showed dislike or antagonism toward each other. Then pairs were randomly assigned by sex to the experimental or the control group. Additional control groups utilized were the two Ford Project control groups composed of those who withdrew from the MDTA program prior to completing 15 percent of their training and those who received no training.

Subjects in the experimental group and three control groups were administered, on a pretest and a posttest basis, the following instruments: (a) California Test of Personality, (b) IPAT Anxiety Scale Questionnaire, and (c) Sequential Tests of Educational Progress. In addition, the experimental group and the first control group were administered Rokeach's Dogmatism Scale. Certain employment variables were investigated eight months following the completion of the training program for the experimental group and the first control group. No significant differences were found between pretest and posttest performances on any of the above instruments. Also, there were no significant differences on the employment variables investigated.

Frazier (9) compared ninety-two high school dropouts who had entered and completed training in the Oklahoma City Manpower Development and Training Program (Ford Project Academic-Vocational and Vocational groups) with 65 students who had graduated from conventional high school vocational programs in Oklahoma City. The Ford Project subjects were drawn from the greater Oklahoma City area, but analysis of their backgrounds indicated that many were from the central city area identified by Levan (13) as having a high incidence of dropping-out of school. The graduates from the conventional high school program all were drawn from schools in the central city area. This strategy for controlling a vast array of background and personal-social variables appeared to be reasonably successful. An extensive comparison of these factors indicated a superiority of the Ford Project subjects on only three subscores out of a number of personality tests. The principal background differences centered around age and maturational factors, with the Ford Project subjects being, on the average, some two years older, more likely to be married, to be living away from the parental home, to own a car, etc.

Comparisons of academic achievement were made on the basis of STEP scores at the completion of training for the group of high school vocational program graduates with the Ford Project Academic-Vocational subjects, the Ford Project Vocational subjects, and the two groups of Ford Project subjects combined. GATB "G" scores were used in the analysis of covariance to control for differences in academic aptitude. All significant differences favored the Ford Project subjects. The Ford Project Academic-Vocational group exceeded the high school graduate group on reading, writing, mathematics, and science achievement scores. There were no significant differences in the comparison with the Ford Project Vocational group. A comparison of the combined Ford Project groups with the high school graduate group resulted in a significant difference in mathematics achievement scores favoring the Ford Project subjects.

Vocational class achievement was examined by a comparison of five specific skills classes (auto-mechanics, cosmetology, general office clerk, stenographer, and welding) with their counterparts in the high school graduate sample. Significant differences were found favoring both of the Ford Project groups, the Academic-Vocational and the Vocational, in welding achievement. The Ford Project Vocational group was found to be significantly better in cosmetology achievement. A comparison with the Ford Project Academic-Vocational group significantly favored the high school group in shorthand achievement.

A follow-up was carried out to assess job success on six factors: (a) the number of weeks between completion of training and beginning of the first job, (b) rates of pay six months after completion of training, (c) satisfaction with jobs, (d) employer ratings of training adequacy, (e) employer ratings of general attitude, and (f) employer ratings of job performance. The only significant differences favored the three Ford Project groups - Academic-Vocational, Vocational, and the two groups combined. Significant differences occurred on hourly rate of pay for welders and on employer ratings of training adequacy.

Quinn (17) utilized the subjects of the Ford Project to investigate personal and social adjustment change, during the course of the training program, as measured by the California Test of Personality. On the basis of pretests and posttests with alternate forms of the California Test of Personality, analyses were carried out to compare changes between the combined training groups and the combined control groups as well as among the following training program and control groups: (a) Academic-Vocational, (b) Vocational, (c) Academic, (d) the early redropout control group, and (e) the no treatment control group. Two major subscores, total personal adjustment and total social adjustment, and the total composite adjustment score of the California Test of Personality were used in the analysis. Analysis of the pretest data indicated that there were no significant differences between the combined training groups and the combined control groups on the above scores.

Findings indicated that all of the experimental and control groups evidenced significant change in personal and total composite adjustment scores. The training program groups did not change significantly on the social adjustment score, while the control groups did evidence significant change on this score. Generally, the control groups evidenced greater change than the training groups on social and total composite adjustment scores. None of the three training groups indicated significantly greater change when compared with each other. This was also true of a comparison of the two control groups. When the three training program groups were compared with the two control groups, both the redropout control group and the no treatment control group made a significantly greater degree of change in total composite adjustment and social adjustment scores than did the Academic-Vocational training group. The redropout control group evidenced a greater change in total composite adjustment scores than did the academic only training group.

Analyses comparing the relationship of a number of personal and family history characteristics with changes in scores revealed only one significant relationship. There was greater positive change in social adjustment scores for married subjects than for unmarried subjects.

Wallace (29) analyzed scores on the Brayfield-Rothe Job Satisfaction Blank administered one year after completion of training to determine if there were significant differences among the three Ford Project experimental groups--Academic, Academic-Vocational, and Vocational training--and the overall control group. The study was confined to the subjects who were administered early posttests. These subjects are referred to as the "Time I" subjects in the Ford Project report. Of the 144 subjects contacted in his follow-up, 55 were found to be employed as of one year after the training period. An analysis of the job satisfaction scores of the employed subjects revealed no significant differences among the three experimental groups and the control group.

Growing out of Wallace's statistical analysis of scores on the Brayfield-Rothe Job Satisfaction Blank was a finding that seems to have considerable importance for the measurement of job satisfaction. Through a multiple regression analysis procedure, five salient concomitant variables of Brayfield-Rothe Job Satisfaction scores were identified: (a) Rural-Urban Orientation II, moral attributes in man's work or nature; (b) California Test of Personality - 1c, sense of personal freedom; (c) GATB - N, numerical; (d) Social Class Value Orientation II, control of destiny; and (e) California Test of Personality - 2b, social skills. There variables accounted for 49 percent of the variance in job satisfaction scores for Wallace's group of subjects.

Boggs (2) made comparisons among the three Ford Project experimental groups--Academic, Academic-Vocational, and Vocational training--and the overall control group on seven measures of vocational success for the year immediately following completing of training. Data were collected and analyzed for the following measures of vocational success: (a) entry into the labor market during the year following training, (b) employment status as of one year following completion of training, (c) number of jobs held, (d) number of days employed, (e) mean weekly wages, (f) scores on the Brayfield-Rothe Job Satisfaction Blank (completed by subjects), and (g) ratings on the Goertzel Job Success Rating Scale (completed by employers).

An initial analysis was made to determine if significant differences existed among the groups. If significant differences were found, between-groups comparisons on all possible pairs of groups were made. Significant differences were found on three of the seven measures of vocational success. Results significantly favored the Vocational group over the Control group on entry into the labor market; the Academic-Vocational and the Vocational groups over the Control group on employment status as of one year following completion of training; and each of the three experimental groups over the Control group on number of days employed during the year following training. Subjects in the Academic-Vocational and Vocational groups also were found to be significantly favored over the Academic group on number of days employed.